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THE OHIO JOURNAL OF SCIENCE

VOL. XXXVI JANUARY, 1936 No. 1

CATALOG OF THE TYPE SPECIMENS OF FOSSILS IN THE UNIVERSITY OF CINCINNATI MUSEUM

MICHAEL STEPHEN CHAPPARS
University of Cincinnati.

INTRODUCTION

The accompanying catalog of type specimens of fossils follows the form set up by Dr. Charles Schuchert and his associates in the Catalogue of Type Specimens of Fossils, Minerals, Rocks, and Ores in the United States National Museum.[1]

It lists alphabetically all Holotypes, Paratypes, Cotypes, subsequently figured specimens, and Plastotypes in the fossil collection of the University of Cincinnati Museum. For each entry is given the catalog number, the name of the species, the author's name, the number of specimens if more than one, the kind of type, the formation, the locality, author and place of publication, and a cross reference if the species appears in the list more than once. In a few cases in which a species is not as yet published, the prefix "Chiro" is added to the kind of type.

For discussion and definition of the kinds of type material the reader is referred to Dr. Schuchert's work cited above, and to the catalog of types published by the Ohio State University Geological Museum in 1924.[1]

In the latter, Dr. Morningstar gives good condensed definitions of the various grades of types, as follows:

"PRIMARY TYPES OR PROTEROTYPES"

"*Holotype*—A single specimen selected from the original material as the type of a species, or a single specimen upon which a species is based is known as the holotype."

[1]Schuchert, U. S. Nat. Mus., Bull. 53, pt. 1, 1905.
[2]Morningstar, Ohio Jour. Sci., Vol. 24, No. 1, Jan. 1924.

"*Paratype*—If a holotype has been selected, but if other specimens are also mentioned, described, figured, or in any way aid in the original description, the latter are called paratypes. A species may therefore have both holotype and one or more paratypes."

"*Cotypes*—If no holotype is selected from the original material, and if two or more specimens are used in describing and figuring a species, these types are known as cotypes."

"*Chirotype*—Chirotype is the term applied to material described in manuscript form. After the manuscript has been published the chirotype will become either a holotype, paratype, etc."

"Secondary or Supplementary Types"

"*Plesiotype*—A specimen from any locality which is compared with a species already established, and which is described and figured as such, is called a plesiotype."

"Artificial Models"

"*Plastotype*—An artificial cast or model made directly from a primary type is called a plastotype."

"Figured Specimens"

"A number of specimens are included which cannot be classed as real types, but which have been figured, as for example, Amphibian Coprolites, Fish Spine, etc.; likewise in the same class comes all figured material to which no specific name has been assigned, as Cythere? sp., Palaeoniscus sp., etc. Such entries are marked figured."

In the University of Cincinnati Museum gummed dots are used to designate type specimens; red dots for Holotypes, Cotypes, and Paratypes, and green dots for others.

Most of the types in the collection are from the collection of S. A. Miller, which came to the University of Cincinnati by purchase in 1917, twenty years after his death. Due largely to the condition in which the collection was received there is doubt regarding a few of the specimens marked by Miller as types. In the cases in which the illustrations could not be matched beyond doubt by the specimens, or in which the specific name given could not be found in the literature, the fact is indicated by a question mark after the type-designation, or by a note under the reference.

The catalog contains 2470 specimens distributed as follows:
Holotypes, 180.
Cotypes, 1593.
Paratypes, 557.
Plesiotypes and figured specimens, 140.

2243. *Acidaspis bucheri* Ulrich (Ms.) Chiro-holotype
Maysville-Corryville (Ord.). Cincinnati, Ohio.

4013. *Actinocrinus albersi* Miller and Gurley Holotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 46, pl. 2, figs. 21–23, 1895.

2227. *Actinocrinus blairi* Miller 3 Cotypes
(=*Cactocrinus glans* (Hall))
Burling group (Miss.). Sedalia, Missouri.
Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 285, pl. 5, figs. 27–29, 1894. Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 35, pl. 5, figs. 27–29, 1892.

2228. *Actinocrinus foveatus* Miller and Gurley 3 Cotypes
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 49, pl. 2, figs. 25–26, 1895.

2229. *Actinocrinus jessieae* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 30, pl. 2, figs. 15–16, 1896.

2229a. *Actinocrinus jessieae* Miller and Gurley 3 Paratypes
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 30, pl. 2, figs. 15–16, 1896.

2230. *Actinocrinus nodosus* Miller Holotype
(=*Cactocrinus thalia* Hall)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, pl. 5, fig. 7, 1891.

2226. *Actinocrinus pettisensis* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 6, pl. 1, figs. 3–4, 1896.

2226a. *Actinocrinus pettisensis* Miller and Gurley 67 Paratypes
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 6, pl. 1, figs. 3–4, 1896.

4010. *Actinocrinus senectus* Miller and Gurley Holotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 36, pl. 2, figs. 23–25, 1897.

2233. *Actinocrinus spectabilis* Miller and Gurley Holotype
Burlington group (Miss.). Burlington, Iowa.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 9, pl. 3, fig. 3, 1896.

1963. *Actinostroma irregulare* Fenton — Holotype
Hamilton group (Dev.). Nora Formation.

2249. *Actinostroma rockfordense* Fenton — 4 Cotypes
Nora formation. Rockford, Illinois.

2232. *Agaricocrinus adamsensis* Miller and Gurley — Holotype
Burlington group (Miss.). Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 9, p. 24, pl. 1, figs. 7–9, 1896.

2232a. *Agaricocrinus adamsensis* Miller and Gurley — Paratype
Burlington group (Miss.). Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 9, p. 24, pl. 1, figs. 7–9, 1896.

3343. *Agaricocrinus illinoisensis* Miller and Gurley — Holotype
Burlington group (Miss.). Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 25, pl. 1, figs. 21–23, 1896.

3343a. *Agaricocrinus illinoiensis* Miller — 1 Paratype
Burlington group. Adams County, Illinois.
Bull. No. 8, Ill. State Mus. Nat. Hist., p. 25, pl. 1, figs. 21–23, 1896.

3367. *Agaricocrinus splendens* Miller and Gurley — Holotype
Keokuk group (Miss.). Crawfordsville, Indiana.
Miller and Gurley, Jour. Cincinnati Soc. Nat. Hist., Vol. 13, p. 18, pl. 4, fig. 12, 1890. 16th Rep. Dept. Geol. Nat. Res. Ind., p. 340, pl. 4, figs. 1–2, 1890. Not in 17th report.

3366. *Agaricocrinus splendens* Miller and Gurley — Paratype
Keokuk group (Miss.). Crawfordsville, Indiana.
Miller and Gurley, Jour. Cincinnati Soc. Nat. Hist., Vol. 13, p. 18, 1890.

3793. *Ambonychia cincinnatiensis* Miller and Faber — Cotype
(= *Byssonychia vera* Ulrich)
Eden (Ord.). Cincinnati, Ohio.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 24, pl. 1, figs. 8–10, 1894.

3794. *Ambonychia cincinnatiensis* Miller and Faber — 8 Cotypes (?)
(= *Byssonychia vera* Ulrich)
Eden (Ord.). Cincinnati, Ohio.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 24, pl. 1, figs. 8–10, 1894.

3787. *Ambonychia robusta* Miller (Part) — 2 Cotypes
(= *Byssonychia richmondensis* Ulrich)
Richmond-Whitewater (Ord.). Richmond, etc., Indiana.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 3, p. 315, 1880.

3866. *Amphoracrinus blairi* Miller and Gurley — Cotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 26, pl. 1, figs. 45–50, 1896.

4005. *Amphorocrinus jessieae* Miller and Gurley — Holotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 21, pl. 3, figs. 18–19, 1896.

1394. *Amplexus bicostatus* Miller Holotype and 4 Paratypes
2237. (See *Amplexus fragilis* White and St. John)
2237a. Burlington group (Miss.). Sedalia, Missouri.
Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 618, pl. 1, fig. 10, 1892. Miller, Adv. Sheets 17th Rep. Dept. Geol. Nat. Res. Ind., p. 8, pl. 1, fig. 10, 1891.

3918. *Amplexus blairi* Miller 3 Cotypes
3919. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets 17th Rep. Dept. Geol. Nat. Res. Ind., p. 8, pl. 1, fig. 7, 1891.

2238. *Amplexus corniculum* Miller Holotype and 48 Paratypes
2238a. Chouteau limestone (Miss.). Pettis, County, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 9, pl. 1, figs. 21–22, 1891.

1394. *Amplexus fragilis* White and St. John
Holotype and 4 Paratypes
2237. (=*Amplexus bicostatus* Miller)
2237a. Burlington group (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 8, pl. 1, fig. 10, 1892. Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 8, pl. 1, fig. 10, 1892. White and St. John, Trans. Chicago Acad. Sci., Vol. 1, p. 116, 1868.

3789. *Arthropora shafferi* (Meek) 4 Cotypes
(See *Ptilodictya* (*Stictopora*) *shafferi* Meek)
Maysville–(Bellevue, Corryville) (Ord.). Cincinnati, Ohio.
Meek, Proc. Acad. Nat. Sci. Philadelphia, p. 317, Ohio Pal., Vol. 1, p. 69, pl. 5, figs. 1a-c, 1873.

4512. *Asidopora eccentrica* (James) Plesiotype
Eden (Southgate) (Ord.). Cincinnati, Ohio.
Twitchell, Amer. Mid. Nat., Vol. 15, No. 6, pl. 30, fig. 16, 1934.

4519. *Atactoporella ortoni* (Nicholson) Plesiotype
Maysville (Bellevue) (Ord.). Clover Creek, Cincinnati, Ohio.
Twitchell, Amer. Mid. Nat., Vol. 15, No. 6, pl. 29, fig. 7, 1934.

3868. *Athyris brittsi* Miller Holotype
Devonian. North Otterville, 17 mi. w. of Sedalia, Missouri.
Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 314, pl. 9, figs. 16–18, 1893.

2242. *Athyris chouteauensis* Miller 100 Cotypes (?)
(Marked types in Miller Collection)
Chouteau limestone (Miss.). Cooper County, Missouri.

3872.
3873. *Athyris ottervillensis* Miller 11 Cotypes
Devonian. Nr. Otterville, 17 mi. w. of Sedalia, Missouri.
Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 314, pl. 9, figs. 14–15, 1893.

511–513. *Atrypa corrugata* Fenton and Fenton
Holotype and 5 Paratypes
Traverse (Dev.). No. 23, Rose Quarry, Near Bay Shore, Michigan.
Fenton and Fenton, Am. Mid. Nat., Vol. 12, p. 5, pl. 1, figs. 10–13, 1930.

561–563. *Atrypa dignata* Fenton and Fenton
Holotype and 2 Paratypes
Traverse (Dev.). No. 22, Rose Quarry, Near Bay Shore, Michigan.
Fenton and Fenton, Am. Mid. Nat., Vol. 12, p. 11, pl. 2, figs. 10–11, 1930.

594–596. *Atrypa littletonensis* Fenton and Fenton
Holotype and 2 Paratypes
Cedar Valley (Dev.).-Littleton, No. 5, Littleton Section. Littleton, Iowa.
Fenton and Fenton, Am. Mid. Nat., Vol. 12, p. 13, pl. 2, figs. 3–4, 1930.

3968–3970. *Atrypa missouriensis* Miller 5 Cotypes
Devonian. Near Otterville, 17 mi. w. of Sedalia, Missouri.
Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 315, pl. 9, figs. 19–21, 1893.

570–577. *Atrypa petosequa* Fenton and Fenton
Holotype and 7 Paratypes
Traverse (Dev.). No. 23, Rose Quarry, Near Bay Shore, Michigan.
Fenton and Fenton, Am. Mid. Nat., Vol. 12, p. 7, pl. 1, figs. 1–8, 1930.

566–568. *Atrypa petosequa lata* Fenton and Fenton
Holotype and 2 Paratypes
Traverse (Dev.). No. 23, Rose Quarry, Near Bay Shore Michigan.
Fenton and Fenton, Am. Mid. Nat., Vol. 12, p. 9, pl. 1, fig. 9, 1930.

580–583. *Atrypa traversensis* Fenton and Fenton
Holotype and 3 Paratypes
Traverse (Dev.). No. 1, Quarry, Mud Lake, E. of Kegomic, Michigan.
Fenton and Fenton, Am. Mid. Nat., Vol. 12, p. 6, pl. 2, figs. 12–14, 1930.

2036–2038. *Aulopora confluens* Fenton 6 Paratypes
Hackberry—Cerro Gordo, Pugnoides zonule (Dev.). Bird Hill, near Rockford, Iowa.
M. A. Fenton, Am. Mid. Nat., Vol. 10, p. 380, pl. 2, figs. 5–7, 1927.

2022–2024. *Aulopora cerebriformis* Fenton Holotype and 2 Paratypes
Shellrock—Lepidocentrus zone—Camarophoria zonule (Dev.). Nora Springs, Iowa.
M. A. Fenton, Am. Mid. Nat., Vol. 10, p. 377, pl. 2, figs. 17–18, 1927.

2033. *Aulopora delicata* Fenton Holotype
Hackberry—Cerro Gordo Substage—Heliophyllum zonule (?) (Dev.). 1 mi. N. W. of Juniper Hill, near Rockford, Iowa.
M. A. Fenton, Am. Mid. Nat., Vol. 10, p. 381, pl. 1, figs. 2–4, 1927.

2028. *Aulopora irregularis* Fenton — Holotype and Allotype
2029. Shellrock—Aulopora zone—Pachyphyllum zonule (Dev.). Nora Springs, Iowa.
M. A. Fenton, Am. Mid. Nat., Vol. 10, p. 376, pl. 2, figs. 11–12, 1927.

2040. *Aulopora linearis* Fenton — Paratype
Shellrock—Aulopora zone—Alveolites zonule (Dev.). Parker's Mill, Mason City, Iowa.
M. A. Fenton, Am. Mid. Nat., Vol. 10, p. 378, pl. 2, fig. 16, 1927.

2041. *Aulopora linearis* Fenton — Holotype (Part)
Shellrock—Lepidocentrus zone—Camarophoria zonule (Dev.). Nora Springs, Iowa.
M. A. Fenton, Am. Mid. Nat., Vol. 10, p. 379, pl. 1, fig. 10, 1927.

1409. *Aulopora michiganensis* Fenton — Holotype
Traverse. No. 22, Rose Quarry, 6 mi. W. of Petoskey, Michigan.

1410. *Aulopora michiganensis* Fenton — 2 Paratypes
Traverse. No. 22, Rose Quarry, 6 mi. W. of Petoskey, Michigan.

2034. *Aulopora modulata* Fenton — 2 Paratypes
2035. Shellrock—Shizophoria zone (Dev.). Flood Cr., 4 mi. E. of Rockford, Iowa.
M. A. Fenton, Am. Mid. Nat., Vol. 10, p. 375, pl. 1, figs. 5–9, 1927.

2031. *Aulopora munda* Fenton — Holotype and Paratype
2032. Shellrock—Aulopora zone—Pachyphyllum zonule (Dev.). Nora Springs, Iowa.
M. A. Fenton, Am. Mid. Nat., Vol. 10, p. 377, pl. 2, figs. 12–14, 1927.

2025–2027. *Aulopora noraensis* Fenton — Holotype and 6 Paratypes
Shellrock — Aulopora zone — Pachyphyllum (Dev.). Nora
2039. Springs, Iowa.
M. A. Fenton, Am. Mid. Nat., Vol. 10, p. 375, pl. 1, fig. 5, pl. 2, figs. 8–10, 1927.

3894. *Aviculopecten sculptilis* Miller — Holotype
Pennsylvanian. Kansas City, Missouri.
Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 702, pl. 20, fig. 5, 1892. Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 92, pl. 20, fig. 5, 1891.

3815. *Batocrinus* (abnormal) Miller and Gurley — Figured specimen
Burlington group (Miss.). Burlington, Iowa.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 64, pl. 4, figs. 24–25, 1896.

3825. *Batocrinus adamsensis* Miller and Gurley — Holotype
Burlington group (Miss.). Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 14, pl. 1, figs. 33–35, 1896.

3816. *Batocrinus approximatus* Miller and Gurley 2 Cotypes
Burlington group (Miss.). Burlington, Iowa.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 56, pl. 4, figs. 10–12, 1896.

3836. *Batocrinus argutus* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 9, pl. 1, figs. 8–9, 1896.

3826. *Batocrinus asper* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 13, pl. 1, figs. 15–16, 1896.

3828. *Batocrinus asperatus* Miller and Gurley Holotype
Burlington group (Miss.). Adams County, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 12, pl. 1, figs. 13–14, 1896.

3829. *Batocrinus basilicus* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 11, pl. 1, figs. 10–12, 1896.

3215. *Batocrinus blairi* Miller Paratype
(= *Eretmocrinus leucosia*)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 39, pl. 6, figs. 7–10, 1892.

3216. *Batocrinus broadheadi* Miller and Gurley
3216a. Holotype and Paratype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 15, pl. 1, figs. 10–11, 1895.

3835. *Batocrinus cognatus* Miller and Gurley Cotype
Burlington group (Miss.). Burlington, Iowa.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 60, pl. 4, fig. 20, 1896.

3219. *Batocrinus divalis* Miller 13 Cotypes
3219a. (= *Dizygocrinus unionensis* var. *divalis* Miller)
Keokuk group (Miss.). Boonville, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 22, pl. 3, figs. 6–7, 1892.

2189. *Batocrinus douglassi* Miller and Gurley
2189a. Holotype and 14 Paratypes.
Burlington group (Miss.). Bozeman, Montana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 29, pl. 2, fig. 26, 1897.

3218. *Batocrinus enodis* Miller and Gurley Holotype and Paratype
3218a. Burlington group (Miss.). Burlington, Iowa.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 25, pl. 1, figs. 16–18, 1896.

3865. *Batocrinus folliculus* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.

Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 15, pl. 1, figs. 36–38, 1896.

3221. *Batocrinus formaceus* Miller and Gurley
3221a. Holotype and 3 Paratypes
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 24, pl. 1, figs. 23–24, 1895.

3837. *Batocrinus germanus* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 5, pl. 1, figs. 1–3, 1896.

3223. *Batocrinus heteroclitus* Miller and Gurley Holotype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 31, pl. 1, figs. 37–39, 1895.

3823. *Batocrinus hodgsoni* Miller and Gurley Holotype
Burlington group (Miss.). Marblehead, Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 8, pl. 1, figs. 6–7, 1896.

3225. *Batocrinus ignotus* Miller and Gurley Holotype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 28, pl. 1, figs. 31–33, 1895.

3226. *Batocrinus imparalis* Miller and Gurley
3226a. Holotype and 23 Paratypes
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 20, pl. 1, figs. 17–18, 1895.

3227. *Batocrinus inconsuetus* Miller and Gurley Holotype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 25, pl. 1, figs. 25–27, 1895.

3228. *Batocrinus incultus* Miller and Gurley
3228a. Holotype and 5 Paratypes
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 21, pl. 1, figs. 19–20, 1895.

3822. *Batocrinus inopinatus* Miller and Gurley Holotype
Keokuk group (Miss.). Boonville, Missorui.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 36, pl. 2, figs. 4–6, 1895.

3230. *Batocrinus insolens* Miller and Gurley Holotype and Paratype
3230a. Burlington group (Miss.). Burlington, Iowa.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 35, pl. 2, figs. 1–2, 1896.

3821. *Batocrinus insperatus* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 22, pl. 1, figs. 21–22, 1895.

3827. *Batocrinus insuetus* Miller and Gurley Holotype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 14, pl. 1, figs. 8–9, 1895.

3231. *Batocrinus jessieae* Miller and Gurley 3 Cotypes
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 20, pl. 1, figs. 27–32, 1896.

3232. *Batocrinus modestus* Miller and Gurley
3232a. Holotype and 6 Paratypes
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 30, pl. 1, figs. 34–36, 1895.

3824. *Batocrinus modulus* Miller and Gurley Holotype
Burlington group (Miss.). Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 16, pl. 1, figs. 39–41, 1896.

3811. *Batocrinus nanus* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 17, pl. 1, figs. 42–44, 1896.

3830. *Batocrinus nitidulus* Miller and Gurley 4 Cotypes
3831. Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 17, pl. 1, figs. 12–13, 1895.

3233. *Batocrinus nodosus* Miller and Gurley Holotype
Burlington group (Miss.). Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 9, p. 5, pl. 1, figs. 1–3, 1896.

3234. *Batocrinus nodulosus* Miller and Gurley Holotype
Burlington group (Miss.). Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 9, p. 6, pl. 1, figs. 4–6, 1896.

3832. *Batocrinus parilis* Miller and Gurley Cotype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 9, p. 17, pl. 2, figs. 1–2, 1896.

3819. *Batocrinus peculiaris* Miller and Gurley Holotype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 18, pl. 1, figs. 14–16, 1895.

3236. *Batocrinus planus* Miller and Gurley 3 Cotypes
3236a. Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 37, pl. 2, figs. 11–14, 1895.

3840. *Batocrinus politus* Miller and Gurley Holotype
Burlington group (Miss.). Burlington, Iowa.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 31, pl. 1, figs. 23–25, 1896.

3237. *Batocrinus polydactylus* Miller and Gurley Holotype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 5, pl. 1, fig. 1, 1895.

3238. *Batocrinus procerus* Miller and Gurley Holotype
Keokuk group. Boonville, Missouri.
Bull. No. 7, Ill. State Mus. Nat. Hist., p. 33, pl. 1, figs. 40–42, 1895.

3820. *Batocrinus proximus* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 7, pl. 1, figs. 4–5, 1896.

3239. *Batocrinus pulchellus* Miller 64 Cotypes
(= *Dizygocrinus unionensis* Worthen)
Keokuk group (Miss.). Boonville, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 68, pl. 11, figs. 13–14, 1891.

3854. *Batocrinus reliquus* Miller and Gurley Holotype
Burlington group (Miss.). Sharon, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 22, pl. 1, figs. 15–17, 1897.

3241. *Batocrinus remotus* Miller and Gurley Holotype and Paratype
3241a. Burlington group (Miss.). Burlington, Iowa.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 43, pl. 2, figs. 15–17, 1896.

3857. *Batocrinus rotuliformis* Miller and Gurley Holotype
Burlington group (Miss.). Sharon, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 26, pl. 1, figs. 26–27; pl. 2, figs. 1–2, 1897.

3243. *Batocrinus rusticellus* Miller and Gurley
3243a. Holotype and 3 Paratypes
Burlington gtoup (Miss.). Sharon, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 23, pl. 1, figs. 18–21, 1897.

3855. *Batocrinus rusticus* Miller and Gurley Holotype
Burlington group (Miss.). Sharon, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 28, pl. 2, figs. 3–6, 1897.

3244. *Batocrinus sampsoni* Miller and Gurley 2 Cotypes
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 7, pl. 1, figs. 2–3, 1895.

3245. *Batocrinus scitulus* Miller and Gurley Holotype and Paratype
3246. Burlington group (Miss.). Sharon, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 19, pl. 1, figs. 10–11, 1897.

3247. *Batocrinus sedaliensis* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 71, pl. 4, figs. 31–32, 1896.

3248. *Batocrinus senex* Miller and Gurley 4 Cotypes
3248a. Burlington group (Miss.). Sharon, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 21, pl. 1, figs. 12–14, 1897.
3249. *Batocrinus serratus* Miller and Gurley
3249a. Holotype and 3 Paratypes
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 27, pl. 1, figs. 28–30, 1895.
3250. *Batocrinus sharonensis* Miller and Gurley
3250a. Holotype? and Paratype?
Burlington group (Miss.). Sharon, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 18, pl. 1, figs. 7–9, 1897.
3251. *Batocrinus solitarius* Miller and Gurley Holotype
Burlington group (Miss.). Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 22, pl. 2, figs. 8–11, 1896.
3252. *Batocrinus variabilis* Miller and Gurley 5 Cotypes
3252a–c. Burlington group (Miss.). Burlington, Iowa.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 58, pl. 4, figs. 13–17, 1896.
3253. *Batocrinus venustulus* Miller and Gurley Holotype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 12, pl. 1, fig. 7, 1895.
868. *Batocrinus venustus* Miller 17 Cotypes
(= *Dizygocrinus euconus* var. *abscissus* Rowley and Hare)
Keokuk group (Miss.). Boonville, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 67, pl. 11, figs. 11–12, 1891.
3255. *Batocrinus veterator* Miller and Gurley Holotype and Paratype
3255a. Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 8, pl. 1, fig. 4, 1895.
3254. *Batocrinus vetustus* Miller and Gurley Holotype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 10, pl. 1, figs. 5–6, 1895.
3860. *Batocrinus vicinus* Miller and Gurley Holotype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 34, pl. 2, figs. 1–3, 1895.
3256. *Batocrinus wachsmuthi* White Cotype
Keokuk group. Crawfordsville, Indiana.
12th Rep. U. S. Geol. Surv. Terr., p. 162, pl. 40, figs. 1a-1b, 1880.
3951a. *Bellerophon blairi* Miller and Gurley 13 Cotypes
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11,

p. 21, pl. 3, figs. 7–8, 1896. (Taken from *Bellerophon sedaliensis*—Box 3951).

3949–3951. *Bellerophon sedaliensis* Miller and Gurley 5 Cotypes
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 21, pl. 3, figs. 9–10, 1896.

1322. *Beyrichia hammelli* Miller an Faber 1 slab and Cotypes
(=*Ctenobolbina hammelli* (Miller and Faber))
Richmond (Arnheim-Waynesville) (Ord.). Versailles, Indiana.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 156, pl. 8, fig. 26, 1894. Miller, N. A. Geol. Pal. 2nd App., p. 787, fig. 1458, 1897.

3912–3915. *Blairella sedaliensis* Miller and Gurley 6 Cotypes
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 7, pl. 1, figs. 4–8, 1896.

1955. *Buthotrephis* Fenton Plasto-holotype
Plattin No. 14 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Walker Museum 25952.
C. L. Fenton, Am. Mid. Nat., Vol. 11, p. 126, pl. 1, fig. 4, 1928.

849. *Buthotrephis brachiatus* Fenton Plasto-holotype
Plattin, No. 24 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Walker Museum 25949.
C. L. Fenton, Am. Mid. Nat. Vol. 11, p. 126, pl. 1, figs. 2–3, 1928.

1954. *Buthotrephis brachiatus* Fenton Paratype
Plattin, No. 24 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Walker Museum 25953.

1952. *Buthotrephis regularis* Fenton Plasto-holotype
Plattin, No. 14 (Ord.). S. Beckett Hill, Ste. Geneveive County, Missouri.
Walker Museum 25951.
C. L. Fenton, Am. Mis. Nat. Vol. 11, p. 126, pl. 1, fig. 1, 1928.

3787. *Byssonychia richmondensis* Ulrich 2 Cotypes
(See *Ambonychia robusta* Miller (Part))
Richmond (Whitewater) (Ord.). Richmond, Indiana.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 3, p. 315, 1878. Ulrich, Geol. Surv. Ohio, Vol. 7, p. 632, pl. 45, figs. 3–4, 1893.

3793. *Byssonychia vera* Ulrich Cotype
(See *Ambonychia cincinnatiensis* Miller and Faber) Eden (Ord.). Cincinnati, Ohio.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 24, pl. 1, figs. 8–10, 1894. Ulrich, Geol. Surv. Ohio, Vol. 7, p. 629, figs. a–c, 1893.

3794. *Byssonychia vera* Ulrich 8 Cotypes ?
(See *Ambonychia cincinnatiensis* Miller and Faber) Eden (Ord.). Cincinnati, Ohio.

Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 24, pl. 1, figs. 8–10, 1894. Ulrich, Geol. Surv. Ohio, Vol. 7, p. 629, figs. a–c, 1893.

1321. *Bythopora dendrina* (James) Holotype
(See *Bythopora fruticosa* Miller and Dyer)
Maysville (Fairmount) (Ord.). Cincinnati, Ohio.
Miller and Dyer, Contr. Pal., No. 2, p. 6, pl. 4, figs. 6–6a, 1878. Miller, N. A. Geol. Pal., p. 295, fig. 461, 1889.

1321. *Bythopora fruticosa* Miller and Dyer Holotype
(See *Bythopora dendrina* (James).)
Maysville-Fairmount. Cincinnati, Ohio.
Contr. Pal., No. 2, p. 6, pl. 4, figs. 6–6a, 1878.
Miller, N. A. Geol. Pal., p. 295, fig. 461, 1889.

2227. *Cactocrinus glans* Hall 3 Cotypes
(See *Actinocrinus blairi* Miller)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 35, pl. 5, figs. 27–29, 1892. 18th Rep. Dept. Geol. Nat. Res. Ind., p. 289, pl. 5, figs. 27–29, 1893.

2230. *Cactocrinus thalia* Hall Holotype
(See *Actinocrinus nodosus* Miller)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 33, pl. 5, fig. 7, 1891.

1494. *Camarophoria paupera* Belanski Paratype
Camarophoria zonule—Mason city—substage—Shellrock (Dev.). Nora Springs, Iowa.
Belanski, Bull. State Univ. Ia. Stud. Nat. Hist., Vol. 12, No. 7, p. 27, pl. 4, figs. 6–14, 1928. Am. Mid. Nat., Vol. 11, p. 193, pl. 15, figs. 18–26, 1928.

1466. *Camarophoria prolifica* Belanski Paratype
Hackberry—Owen substage (Dev.)., Solenopora zonule. 3 mi. S. of Rockwell, Iowa.
Belanski, Univ. Ia. Stud. Nat. Hist., Vol. 12, No. 7, p. 32, 1928.

3807. *Cancellaria livingstonensis* Miller Holotype
Ripley (Cret.). Livingston, Alabama.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 5, pl. 4, figs. 4–4a, p. 86, 1882.

3804. *Caryocrinites ellipticus* (Miller and Gurley) Cotype
(See *Caryocrinus ellipticus* Miller and Gurley)
Clinton (Osgood) (Sil.). Osgood, Indiana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 5, p. 10, pl. 2, figs. 13–14, 1894.

3804. *Caryocrinus ellipticus* Miller and Gurley Cotype
(=*Caryocrinites ellipticus* (Miller and Gurley))
Clinton (Osgood) (Sil.). Osgood, Indiana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 5, p. 10, pl. 2, figs. 13–14, 1894.

1460. *Ceraurus pleurexanthemus* Green Plasto-geno-holotype (Restored)
Trenton (Ord.) Trenton Falls, New York.

Greene, Monthly Amer. Jour. Geol., Vol. 1, p. 560, pl. 4, fig. 10, 1832.

3923. *Chaenomya longa* Miller and Gurley — Cotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 8, pl. 1, figs. 12–13, 1896.

3258. *Clidophorus chicagoensis* Miller — 3 Cotypes
Niagara group (Sil.). Chicago, Illinois.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 3, p. 314, pl. 8, figs. 2–2a, 1881.

3967. *Clidophorus faberi* Miller — 13 Cotypes
Richmond (Ord.). Near Versailles, Indiana.
Miller, N. A. Geol. Pal., p. 471, fig. 795, 1889.

3845. *Codaster blairi* Miller and Gurley — Holotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 86, pl. 5, figs. 20–22, 1895.

3814. *Codaster gratiosus* Miller — Holotype
Keokuk group (Miss.). Near Bloomfield, Missouri.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 2, p. 257, pl. 15, figs. 5–5a, 1880.

3839. *Codaster jessieae* Miller and Gurley — Holotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 89, pl. 5, figs. 20–22, 1896.

4746–4748. *Collenia columnaris* Fenton and Fenton — Holotype and 2 Paratypes
(Altyn-upper). Near Appekunny Falls, Swift Current Valley, Glacier National Park, Montana.
Fenton and Fenton, Jour. Geol., Vol. 39, p. 682, pl. 1–2, 1931.

4739. *Collenia compacta* Walcott — Plesiotype
Near Swift Current Pass, Glacier National Park, Montana.
Fenton and Fenton, Jour. Geol., Vol. 39, p. 684, pl. 8, fig. 2, 1931. Walcott, Smithsonian Misc. Coll., Vol. 64, p. 112, pl. 15, fig. 7, 1914.

4744–4745. *Collenia ? frequens* Walcott — 2 Plesiotypes
(Siyeh). Near Swift Current Pass, Glacier National Park, Montana.
Fenton and Fenton, Jour. Geol., Vol. 39, p. 685, pl. 8, fig. 1, 1931. Walcott, Smithsonian Misc. Coll., Vol. 64, p. 113, pl. 10, fig. 3, 1914.

7626. *Collenia symmetrica* Fenton and Fenton — Paratype
(Lower siyeh). East Bank Pass.
Fenton and Fenton, Jour. Geol., Vol. 39, p. 683, pls. 3–5, 1931.

4740–4742. *Collenia undosa* Walcott — 2 Plesiotypes
(Sheppard). Garden Wall, above Grinnell Glacier, Glacier National Park, Montana.
Fenton and Fenton, Jour. Geol., Vol. 39, p. 684, pl. 6; pl. 7, figs. 3–5, 1931. Walcott, Smithsonian Misc. Coll., Vol. 64, p. 113, pl. 13, figs. 1–2; pl. 14, figs. 1–2, 1914.

3039. *Collettosaurus missouriensis* (Butts) Topotype
(See *Notalacerta missouriensis* Butts)
(Upper Coal Measure). Kansas City, Missouri.
Charles W. Gilmore, Smithsonian Misc. Coll., Vol. 80, No. 3, p. 58, fig. 30, 1927. Butts, Kansas City Sci., Vol. 5, No. 2, p. 18, 1891.

1964. *Columnaria halli* Nicholson 2 Plesiotypes
1965. Plattin, No. 24 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
C. L. Fenton, Am. Mis. Nat., Vol. 11, p. 128, pl. 2, figs. 1–2, 1928.

3984– *Conularia blairi* Miller and Gurley 3 Cotypes
3986. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 3, p. 73, pl. 7, figs. 14–15, 1894.

3801. *Conularia gattingeri* Safford Plasto-holotype
Trenton (Ord.). Nashville, Tennessee.
Safford, Geol. Tenn., p. 289, 1869.

3803. *Conularia roeperi* Miller and Gurley Holotype
(Coal Measures–Penn.) Luzerne County, Pennsylvania.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 26, pl. 3, figs. 1–2, 1896.

1393. *Conularia sedaliensis* Miller and Gurley 5 Cotypes
1399. Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 28, pl. 3, figs. 4–5, 1896.

3895. *Corydocephalus byrnesanus* (Miller and Gurley) Holotype
(See *Lichas byrnesanus* Miller and Gurley)
Niagaran—(Laurel) (Sil.). Near Madison, Indiana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 3, p. 78, pl. 8, figs. 8–9, 1893.

1504. *Cranaena iowensis* (Calvin) Plesiotype
Cedar Valley (Dev.). Randalia, Iowa.
Belanski, Univ. Ia. Stud. Nat. Hist., Vol. 12, No. 8, p. 8, 1929.

5050. *Cranaena romingeri* (Hall) 3 Plesiotypes
Traverse, No. 22 (Dev.). Rose Quarry, Near Bay Shore, Michigan.
Belanski, Univ. Ia. Stud. Nat. Hist., Vol. 12, No. 8, p. 6, 1929.

3974– *Crania blairi* Miller 4 Cotypes
3976. (See *Crania rowleyi* Gurley)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 56, pl. 9, figs. 5–6, 1892.

1496. *Crania millepunctata Belanski* Paratype
Crania zonule, Rock Grove substage—Shellrock (Dev.). Ulster township, 5 mi. S. E. of Rudd, Iowa.
Belanski, Am. Mid. Nat., Vol. 11, p. 186, pl. 12, figs. 4–6, 1928.

3974– *Crania rowleyi* Gurley 4 Cotypes
3975. (=*Crania blairi* Miller)
Chouteau limestone (Miss.). Sedalia, Missouri.

Gurley, New Carb. Foss., Bull. No. 1, p. 3, 1883. Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 56, pl. 9, figs. 5–6, 1892.

1469. *Craspedophyllum iowaensis* Belanski — 2 Paratypes
1476. Shellrock stage—Mason City Substage (Dev.). Pachyphyllum zonule. Nora Springs, Iowa, and Quarry near C. M. and St. Paul Depot.

3806. *Cristellaria rotulata?* D'Ozbigny — 11 Plesiotypes
Ripley or Upper pt. Rotten limestone. Near Livingston, Alabama.
C. Schlumberger, Jour. Cincinnati Soc. Nat. Hist., Vol. 5, p. 119, pl. 5, figs. 2–2a, 1882.

1322. *Ctenobolbina hammelli* (Miller and Faber) — Cotype
(See *Beyrichia hammelli* Miller and Faber)
Richmond (Arnheim — Waynesville) (Ord.). Versailles, Indiana.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 156, pl. 8, fig. 26, 1894. Miller, N. A. Geol. Pal., 2nd. App., p. 787, fig. 1458, 1897.

3799. *Cuneamya coriformis* Miller — Cotype
Maysville—(McMillan) (Ord.). Cincinnati, Ohio.
Miller, N. A. Geol. Pal., p. 474, figs. 805–806, 1899.

4012. *Cyathocrinus blairi* Miller and Gurley — 3 Cotypes
4025. Chouteau limestone (Miss.). Sedalia, Missouri.
4026. Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 67, pl. 4, figs. 11–15, 1895.

4027. *Cyathocrinus blairi* Miller and Gurley — Plesiotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 50, pl. 3, figs. 21–22, 1896.

1949. *Cyathocrinus boonvillensis* Miller — 56 Paratypes
867. Keokuk group (Miss.). Boonville, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 29, pl. 4, figs. 3–4, 1891.

3838. *Cyathocrinus brittsi* Miller and Gurley — Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 70, pl. 4, figs. 35–36, 1895.

4006. *Cyathocrinus chouteauensis* Miller and Gurley — Holotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 68, pl. 4, fig. 16, 1895.

4030. *Cyathocrinus chouteauensis* Miller and Gurley — Plesiotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 9, p. 38, pl. 2, fig. 24, 1895.

3841. *Cyathocrinus macadamsi* Miller and Gurley — 3 Cotypes
3842. St. Louis Group (Miss.). Alton, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 69, pl. 4, figs. 31–32, 1895.

1473. *Cyathophyllum lincolnensis* Belanski Paratype
Shellrock—Nora Substage (Dev.). Cyathophyllum zonule. Whellwood, Iowa.

1397. *Cyclospongia discus* Miller 2 Cotypes
1398. Helderberg (Dev.). Bunker Hill, Indiana.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 5, pl. 1, figs. 8–9, 1891.

1477. *Cylindrophyllum floydense* Belanski Paratype
Shellrock—Mason City Substage (Dev.). Camarophoria zonule. Nora Springs, Iowa.
Balanski, Am. Mid. Nat., Vol. 11, p. 176, pl. 12, fig. 1, 1928.

3795. *Cymatonota cylindrica* (Miller and Faber) 5 Cotypes
3796. (See *Orthodesma cylindricum* Miller and Faber)
Richmond (Waynesville) (Ord.). Warren County, Ohio.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 22, pl. 1, figs. 1–4, 1894.

3960. *Cypricardella eximia* Miller and Gurley 4 Cotypes
3961. (= *Microdon? eximia* Miller and Gurley)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 15, pl. 2, fig. 25, 1896.

3263. *Cypricardella borbyi* Miller Holotype
(= *Microdon? gorbyi* Miller)
Keokuk group (Miss.). Boonville, Missouri.
Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 702, pl. 20, figs. 6–7, 1891. Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 92, pl. 20, figs. 6–7, 1891.

106. *Cyrtoceras amoenum* Miller Holotype
Richmond—(Whitewater) (Ord.). Richmond, Indiana.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 1, p. 105, pl. 3, fig. 8, 1878.

102. *Cyrtoceras faberi* James Holotype
Richmond—(Whitewater) (Ord.). Richmond, Indiana.
James, Jour. Cincinnati Soc. Nat. Hist., Vol. 8, p. 246, pl. 4, figs. 3a–3b, 1886.

300. *Cyrtoceras magister* Miller Holotype
Eden—(Southgate) (Ord.). Columbia Ave., Cincinnati, Ohio.
Miller, Cincinnati Quart. Jour. Sci., Vol. 2, p. 284, Text, fig. 17, 1875. Miller, N. A. Geol. Pal., p. 434, fig. 729, 1889.

103. *Cyrtoceras tenuiseptum* Faber 2 Cotypes
104. Richmond—(Waynesville) (Ord.). Near Waynesville, Ohio.
Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 9, p. 18, pl. 1, figs. 3a–3c, 1886.

105. *Cyrtoceras ventricosum* Miller Holotype
Eden—(Southgate) (Ord.). Cincinnati, Ohio.
Miller, Cincinnati Quart. Jour. Sci., Vol. 2, p. 131, fig. 16, 1875.

2187. *Decadocrinus douglassi* (Miller and Gurley) Holotype
(See *Poteriocrinus douglassi* Miller and Gurley)
Bridger Mts. (Miss.). Bozeman, Montana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 83, pl. 5, figs. 16–17, 1896.

1497 *Devonocidaris primaevus* Belanski 24 Cotypes
Eatonia Faunule—Mason City Substage, Shellrock (Dev.). 4 mi. S. E. of Nora Springs, Iowa.
Belanski, Am. Mid. Nat., Vol. 11, p. 184, pl. 13, figs. 29–34, 1928.

2185. *Dichocrinus douglassi* (Miller and Gurley) Holotype
(See *Platycrinus douglassi* Miller and Gurley)
Bridger Mts. (Miss.). Bozeman, Montana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 86, pl. 5, figs. 18–19, 1896.

3987–3989. *Dielasma occidentalis* (Miller) 27 Cotypes
(See *Terebratula occidentalis* Miller)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 59, pl. 9, figs. 10–13, 1893.

3920. *Discina sampsoni* Miller 3 Cotypes
(=*Orbiculoidea sampsoni* (Miller))
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 80, pl. 13, figs. 10–12, 1891.

868. *Dizygocrinus euconus* var. *abscissus* Rowley and Hare 17 Cotypes
(See *Batocrinus venustus* Miller)
Keoukuk group (Miss.). Boonville, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 67, pl. 11, figs. 11–12, 1891.

3239. *Dizygocrinus unionensis* Worthen 64 Cotypes
(See *Batocrinus pulchellus* Miller)
Keokuk group (Miss.). Boonville, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 68, pl. 11, figs. 13–14, 1891.

3219. *Dizygocrinus unionensis* var. *divalis* Miller 13 Cotypes
3219a. (See *Batocrinus divalis* Miller)
Keokuk group (Miss.). Boonville, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 22, pl. 3, figs. 6–7, 1892.

3267. *Dorycrinus suboviformis* Miller and Gurley
3267a. Holotype and 15 Paratypes
Burlington group (Miss.). Sharon, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 30, pl. 2, figs. 7–9, 1897.

1967. *Dystactospongia minor* Ulrich and Everett Plesiotype
Plattin, No. 32 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, p. 127, 1928. Ulrich and Everett, Geol. Surv. Ill., Vol. 8, p. 278, pl. 8, figs, 3a–3b, 1890.

1441. *Eatonia gregaria* Belanski Paratype
Shellrock—Mason City Substage (Dev.). Eatonia zonule. 4 mi. S. E. of Nora Springs, Iowa.
Belanski, Am. Mid. Nat., Vol. 11, p. 196, pl. 15, figs. 7–17, 1928.

3902– *Edmondia albersi* Miller and Gurley 6 Cotypes
3904. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 8, pl. 1, figs. 9–11, 1896.

3921. *Elymella missouriensis* Miller and Gurley 2 Cotypes
3922. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 15, pl. 2, figs. 11–12, 1896.

3808. *Endoceras bristolense* Miller 2 Cotypes
3809. Richmond—(Maquoketa) (Ord.). Bristol, Illinois.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 5, p. 85, pl. 4, figs. 2–2a, 1882.

3268. *Endoceras kentuckiensis* Miller ms. Holotype?
(Marked type in Miller Coll.)

1320. *Eocidaris blairi* Miller 8 Cotypes
Keokuk group (Miss.). Boonville, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 73, pl. 12, figs. 1–2, 1891.

3215. *Eretmocrinus leucosia* Hall Paratype
(See *Batocrinus blairi* Miller)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 39, pl. 6, figs. 7–10, 1892.

3276. *Eucalyptocrinus crassus* Hall Figured specimen
Niagara group (Sil.). Shelby County, Indiana.
Wetherby, Jour. Cincinnati Soc. Nat. Hist., Vol. 2, pl. 8, figs. 5–8, p. 7, footnoote, 1879.

3269. *Eucalyptocrinus* (*Hypanthocrinus*) *proboscidalis* Miller Plasto-holotype
Niagara group (Sil.). Pontiac, Ohio.
Miller, Jour. Cincinnati Soc. Nat. Hist., p. 224, pl. 9, fig. 2, Vol. 5, 1882.

1960. *Eunella lincklaeni* Hall Plasto-cotype
Hamilton (Dev.). Delphi Falls, New York.
American Museum of National History 5219.

3996. *Glossina sedaliensis* Miller 5 Cotypes
3997. (See *Lingula sedaliensis* Miller)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 54, pl. 9, fig. 2, 1892.

3955. *Goniatites blairi* Miller and Gurley Holotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 35, pl. 4, figs. 4–5, 1896.

3896. *Goniatites jessieae* Miller and Gurley 4 Cotypes
3897. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 46, pl. 5, figs. 18–20, 1896.

1467. *Gypidula comis* (Owen) Plesiotype
Cedar Valley—Upper Davenport Substage (Dev.). Solon, Iowa.

Fenton and Fenton, Univ. Ia. Stud. Nat. Hist., Vol. 12, No. 7, p. 9, 1928.

3146. *Gypidula cornuta* Fenton and Fenton Plesiotype
Hackberry—Cerro Gordo Substage (Dev.), Xenocidaris zonule. R. B. and T. Co. Pit, Rockford, Iowa.
Fenton and Fenton, The Stratigraphy and Fauna of the Hackberry Stage of the Upper Devonian, Vol. 1, p. 121, figs. 26–31, 1924.

1468. *Gypidula cornuta parva* Fenton and Fenton Plesiotype
Hackberry—Cerro Gordo Substage (Dev.)., Devonocidaris zonule. Bird Hill, Near Rockford, Iowa.
Fenton and Fenton, The Stratigraphy and Fauna of the Hackberry Stage of the Upper Devonian, Vol. 1, p. 123, pl. 25, figs. 32–35, 1924.

4521. *Hallopora dalei* (Milne—Edwards and Haime) Plesiotype Thin section
Maysville (Mt. Hope) (Ord.). Cincinnati, Ohio.
G. B. Twitchell Coll.

4511. *Hallopora ramosa* (D'Orbigny) Plesiotype Thin section
Maysville (McMillan) (Ord.). Cincinnati, Ohio.
G. B. Twitchell Coll.

3871. *Heterocrinus heterodactylus* Hall Plesiotype
Eden. Cincinnati, Ohio.
Hall, Pal. New York, Vol. 1, p. 279, pl. 76, figs. 1a-o, 1847.
Meek, Geol. Surv. Ohio. Pal, Vol. 1, p. 12, pl. 1, figs. 1a–1b, 1873.

4510. *Heterotrypa* (On *Monticulipora* on *Platystrophia*) Nicholson Plesiotype, Thin section
Maysville (Bellevue) (Ord.). Clover Creek, Cincinnati, Ohio.
G. B. Twitchell Coll.

4515. *Heterotrypa* (On *Monticulipora* on *Platystrophia*) Nicholson Plesiotype, Thin section
G. B. Twitchell Coll.

4517. *Heterotrypa frondosa* (D'Orbigny) Plesiotype, Thin Section
Maysville (Mt. Auburn) (Ord.). Cincinnati, Ohio.
Twitchell, Amer. Mid. Nat., Vol. 15, No. 6, pl. 30, fig. 12, 1934.

4524. *Homotrypella hospitalis* (Nicholson) Plesiotype, Thin Section
Maysville (Mt. Auburn) (Ord.).
Twitchell, Amer. Mid. Nat., Vol. 15, No. 6, pl. 30, fig. 17, 1934.

4501. *Homotrypella hospitalis* (Nicholson) Plesiotype, Thin section
Mt. Auburn var. Richmond (Waynesville) (Ord.).
G. B. Twitchell Coll.

4522. *Homotrypella hospitalis* (Nicholson) Plesiotype, Thin section
Richmond (Waynesville) (Ord.). Cincinnati, Ohio.
G. B. Twitchell Coll.

3990. *Hustedia triangularis* (Miller) 2 Cotypes
3991. (See *Retzia triangularis* Miller)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 61, pl. 9, figs. 25–26, 1892.

3384. *Hydreionocrinus depressus* Hall — Holotype and 5 Paratypes
3385. Kaskaskia group (Miss.). Kings Mt.
Wetherby, Jour. Cincinnati Soc. Nat. Hist., Vol. 3, p. 325, pl. 9, figs. 1–4, 6, 1880.

3887. *Hyolithes? dubius* Miller and Faber — Cotype
Richmond (Ord.). Versailles, Indiana.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 155, pl. 8, fig. 23?, 1894.

3899. *Hyolithes lanceolatus* Miller — 3 Cotypes
3900. Chouteau limestone (Ord.). Sedalia, Missouri.
Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 317, pl. 9, figs. 35–36, 1894.

1334. *Hyolithes versaillesensis* Miller and Faber — Cotype
Richmond (Ord.). Versailles, Indiana.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 155, pl. 8, figs. 20–22, 1894.

1492. *Hypothyridina magister* Belanski — Paratype
Shellrock (Dev.).—Mason City Substage, Camarophoria zonule. Nora Springs, Iowa.
Belanski, Am. Mid. Nat., Vol. 11, p. 198, pl. 15, figs. 1–6, 1928.

3892. *Igoceras quincyense* (McChesney) — Holotype
(See *Platyceras missouriense* Miller)
Burlington group (Miss.). Sedalia, Missouri.
Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 82, pl. 14, fig. 2, 1891.

3890. *Igoceras quincyense* (McChesney) — 2 Paratypes
3891. (See *Platyceras pettisense* Miller)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 81, pl. 14, fig. 1891.

3953. *Leiopteria speciosa* Miller and Gurley — 2 Cotypes
3954. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 13, pl. 2, fig. 10, 1896.

3956– *Leiopteria subovata* Miller and Gurley — 5 Cotypes
3959. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 13, pl. 2, figs. 7–9, 1896.

1498. *Lepidocentrus? thomasi* Belanski — 12 Cotypes
Shellrock—Mason City Substage (Dev.)., Camarophoria faunule. Nora Springs, Iowa.
Belanski, Am. Mid. Nat., Vol. 11, p. 181, pl. 13, figs. 1–16, 1928.

3273. *Leptopora gorbyi* Miller — 16 Cotypes
(See *Leptopora typa* Winchell)
Chouteau limestone (Miss.). Cooper County, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 6, pl. 1, figs. 1–4, 1891.

3273. *Leptopora typa* Winchell — 16 Cotypes
(See *Leptopora gorbyi* Miller)

Chouteau limestone (Miss.). Cooper County, Missouri.
Winchell, Proc. Acad. Nat. Sci. Phil., p. 3, 1863. Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 6, pl. 1, figs. 1–4, 1891.

3785. *Leptotrypa calceola* (Miller and Dyer) 104 Cotypes
(See *Monticulipora calceola* Miller and Dyer)
Maysville—Corryville (Ord.). Cincinnati, Ohio.
Miller and Dyer, Jour. Cincinnati Soc. Nat. Hist., Vol. 1, p. 26, pl. 1, figs. 11–11a, 1878.

3895. *Lichas byrnesanus* Miller and Gurley Holotype
(=*Corydocephalus byrnesanus* (Miller and Gurley))
Niagaran—Laurel (Sil.). Near Madison, Indiana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 3, p. 78, pl. 8, figs. 8–9, 1893.

599. *Lichenocrinus affinis ashmanni* Faber Figured specimen
Decorah (Ord.). Fountain, Minnesota.
Fenton, Amer. Mid. Nat., Vol. 11, No. 9, p. 498, pl. 37, fig. 12, 1929.

10008–10010. *Lichenocrinus columns* (Unattached) Faber 3 Figured specimens
McMicken (Ord.). Cincinnati, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 457, pl. 27, figs. 1–3, 1929.

10017–10022. *Lichenocrinus crateriformis* Hall 2 Plesiotypes
Waynesville (Ord.). N. of L.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 470, pl. 32, figs. 5–7, 1929.

875. *Lichenocrinus* aff. *crateriformis* Hall Figured specimen
Beloit formation. Black River, Bed 4 (Ord.), Minneapolis, Minnesota.
Fenton, Amer. Mid. Nat., Vol. 11, No. 9, p. 496, pl. 37, figs. 5–8, 1929.

10011. *Lichenocrinus* cf. *dubius* Miller Figured specimen
Fairmount (Ord.). Cincinnati, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 457, pl. 27, fig. 4, 1929.

3875. *Lichenocrinus dubius* Miller Plesiotype
Cincinnatian (Ord.). Cincinnati, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 464, pl. 29, fig. 9, pl. 30, figs. 1–3, 1929.

10016. *Lichenocrinus dubius* Miller Plesiotype
Mt. Hope (Ord.). Mt. Hope Road Quarry, Cincinnati, Ohio.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 3, p. 234, pl. 7, figs. 5–5a, 1880.

10037. *Lichenocrinus dubius* Miller Plesiotype
McMicken (Fulton reoccurrence) (Ord.)., Rapid Run, Cincinnati, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 464, pl. 29, fig. 9; pl. 30, figs. 1–3, 1929.

1390. *Lichenocrinus dyeri* Hall — Plesiotype
Maysville—Corryville (Ord.). Cincinnati, Ohio.
Meek, Geol. Surv. Ohio Pal., Vol. 1, pt. 2, p. 51, pl. 3, figs. 2 and 3a–3h, 1873. Faber, Am., Nat., Vol. 11, p. 469, pl. 27, fig. 5; pl. 34, figs. 7–12, 1929.

10012. *Lichenocrinus dyeri* Hall — 3 Plesiotypes
10023. Corryville (Ord.). Fairview Heights, Cincinnati, Ohio.
10024. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 469, pl. 27, fig. 5; pl. 34, figs. 7–12, 1929.

10046. *Lichenocrinus irregularis* Faber — Holotype
Whitewater (Ord.). Dodge Creek, Oxford, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 473, pl. 32, fig. 13, 1929.

10040. *Lichenocrinus kemperi* Faber — Holotype
Elkhorn (Ord.). 2½ mi. S. of Eaton, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 473, pl. 32, figs. 1–4, 1929.

1388. *Lichenocrinus milleri* Faber — Paratype
(See *Lichenocrinus tuberculatus* Miller)
Richmond (Ord.). Hill's Mills, Near Richmond, Indiana.
Miller, Jour. Cincinnati Quart. Jour., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 476, pl. 33, figs. 3–9, 1929.

10030. *Lichenocrinus milleri* Faber — 2 Paratypes
10047. Elkhorn (Ord.). Osgood, Indiana.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 476, pl. 33, figs. 3–9, 1929.

3878. *Lichenocrinus milleri* Faber — Paratype
(See *Lichenocrinus tuberculatus* Miller)
Richmond (Ord.). Hill's Mills, Near Richmond, Indiana.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 476, pl. 33, figs. 3–9, 1929.

10029. *Lichenocrinus milleri* Faber — Holotype
Whitewater (Ord.). Near Osgood Pike, or place of type.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 476, pl. 33, figs. 3–9, 1929.

10029a. *Lichenocrinus milleri* Faber — Paratype
Whitewater (Ord.). Near Osgood Pike or place of type.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 476, pl. 33, figs. 3–9, 1929.

10021. *Lichenocrinus milleri* Faber — Paratype
(See *Lichenocrinus tuberculatus* Miller)
Elkhorn (Ord.). Lytle, Near Lebanon, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 476, pl. 33, figs. 3–9, 1929.

881. *Lichenocrinus* aff. *nodosus minnesotensis* Faber — Figured Specimen
Beloit Formation—Black River, (bed 4) (Ord.)., Minneapolis, Minnesota.

Fenton, Am. Mid. Nat., Vol. 11, No. 9, p. 495, pl. 37, figs. 2–3, 1929.

10032. *Lichenocrinus nodosus* Faber Holotype and Paratype
10033. Waynesville (Ord.). Weisburg, Indiana, Cut. 14.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 477, pl. 33, figs. 10–11, 1929.

10006. *Lichenocrinus schlemmeri* Faber Paratype
Southgate (Ord.). Rapid Run Creek, Cincinnati, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 466, pl. 31, figs. 1–3, 1929.

10026. *Lichenocrinus shideleri* Faber Holotype and Paratype
10028. Saluda (Ord.). Mixerville, Indiana.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 478, pl. 34, figs. 3–4; pl. 28, fig. 9, 1929.

10025. *Lichenocrinus shideleri regularis* Faber Paratype
Elkhorn (Ord.). Osgood, Indiana.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 479, pl. 34, figs. 1–2; pl. 28, fig. 8, 1929.

1387. *Lichenocrinus shideleri regularis* Faber Paratype
(See *Lichenocrinus tuberculatus* Miller)
Richmond (Ord.). Hill's Mills, Near Richmond, Indiana.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 479, 1929.

10027. *Lichenocrinus shideleri regularis* Faber Holotype
Elkhorn (Ord.). Richmond, Indiana.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 479, pl. 28, fig. 8; pl. 34, figs. 1–2, 1929.

10007. *Lichenocrinus stetteri* Faber Holotype
Southgate (Ord.). Rapid Run Creek, Cincinnati, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 466, pl. 30, figs. 4–5, 1929.

1387. *Lichenocrinus tuberculatus* Miller Cotype
(= *Lichenocrinus shideleri regularis* Faber)
Richmond (Ord.). Hill's Mills, Near Richmond, Indiana.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 474, pl. 33, figs. 1–2, 1929.

3978. *Lichenocrinus tuberculatus* Miller 7 Cotypes
3983. Richmond (Ord.). Hill's Mills, Near Richmond, Indiana.
3877. Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 474, pl. 33, figs. 1–2, 1929.

10019. *Lichenocrinus tuberculatus* Miller Plesiotype
Elkhorn (Ord.). 2½ mi. S. of Eaton, Ohio.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 457, pl. 28, fig. 6, 1929.

10021. *Lichenocrinus tuberculatus* Miller Cotype
(= *Lichenocrinus milleri* Faber)
Elkhorn (Ord.). N. of L. and Lytle, near Lebanon, Ohio.

Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 474, pl. 33, figs. 1–2, 1929. Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874.

10014. *Lichenocrinus tuberculatus* Miller Plesiotype
Elkhorn (Ord.). Whitewater River, Richmond, Indiana.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 474, pl. 28, fig. 1, 1929.

10036. *Lichenocrinus tuberculatus* Miller Plesiotype
Elkhorn (Ord.). Whitewater River, Richmond, Indiana.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 474, pl. 29, fig. 4, 1929.

10035. *Lichenocrinus tuberculatus* Miller Plesiotype
Elkhorn (Ord.). Whitewater River, Richmond, Indiana.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 459 and 474, pl. 29, fig. 3, 1929.

10039. *Lichenocrinus tuberculatus* Miller 2 Plesiotypes
10039a. Elkhorn (Ord.). N. of L.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 460 and 474, pl. 29, figs. 7–8, 1929.

10020. *Lichenocrinus tuberculatus* Miller Plesiotype
Elkhorn (Ord.). Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 459, and 474, pl. 28, figs. 10–11, 1929.

10015. *Lichenocrinus tuberculatus* Miller Plesiotype
Elkhorn (Ord.). N. of L.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 246, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 457 and 474, pl. 28, fig. 3, 1929.

10031. *Lichenocrinus tuberculatus* Miller Plesiotype
Elkhorn (Ord.). Whitewater River, Richmond, Indiana.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 474, pl. 33, fig. 1, 1929.

10034. *Lichenocrinus tuberculatus* Miller Plesiotype
Elkhorn (Ord.). N. of L.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, pp. 460 and 474, pl. 29, fig. 6, 1929.

3878. *Lichenocrinus tuberculatus* Miller 6 Cotypes
1388. (= *Lichenocrinus milleri* Faber)
Richmond (Ord.). Hill's Mills, Near Richmond, Indiana.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 346, fig. 38, 1874. Faber, Am. Mid. Nat., Vol. 11, p. 474, pl. 33, figs. 1–2, 1929.

10029a. *Lichenocrinus tuberculatus* Miller Figured specimen
(See *Lichenocrinus milleri* Faber.)
Whitewater. Near Osgood Pike, or place of type.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 476, pl. 33, figs. 3–9, 1929.

10001. *Lichenocrinus twitchelli* Faber Holotype and 2 Paratypes
10002.
10003.
10013. Southgate (Ord.). Rapid Run Creek, Cincinnati, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 463, pl. 31, figs. 6–10, 1929.

10004. *Lichenocrinus vaupeli* Faber Holotype
Southgate (Ord.). Rapid Run, Cincinnati, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 467, pl. 31, figs. 4–5, 1929.

10038. *Lichenocrinus* Faber Figured specimen
Waynesville (Ord.). Cut 14, Weisburg, Indiana.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 457, pl. 29, fig. 5, 1929.

10018. *Lichenocrinus* Faber Figured specimen
Waynesville (Ord.). Cut 14, Weisburg, Indiana.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 457, pl. 28, fig. 5, 1929.

10043. *Lichenocrinus* (young) Figured specimen
Liberty (Ord.). 4 mi. Creek, Oxford, Ohio.
Faber, Am. Mid. Nat., Vol. 11, No. 9, p. 460, pl. 28, fig. 13, 1929.

600. *Lichenocrinus* Figured specimen
Decorah (Ord.). N. W.¼, S. E. ¼, Sec. 35, T10TN, Rx111W, Near Rochester, Minnesota.
Fenton, Am. Mid. Nat., Vol. 11, No. 9, p. 497, pl. 37, fig. 10, 1929.

3993– *Lingula gorbyi* Miller 9 Cotypes
3995. Chouteau limestone (Ord.). Sedalia, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 55, pl. 9, figs. 3–4, 1892.

3938. *Lingula parrishi* Miller 2 Cotypes
3939. (Pennsylvanian) Layer 85. Kansas City, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 53, pl. 8, fig. 2; pl. 9, fig. 1, 1892.

3996. *Lingula sedaliensis* Miller 5 Cotypes
3997. (=*Glossina sedaliensis* Miller)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 54, pl. 9, fig. 2, 1892.

3936. *Lunulicardium grande* Miller and Gurley 2 Cotypes
3937. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 5, pl. 1, figs. 1–3, 1896.

3889. *Lunulicardium retrorsum* Miller and Gurley Cotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 6, pl. 2, fig. 26, 1896.

1971. *Maclurea bigsbyi* var. *dixonensis* Ulrich Plasto-plesiotype
(=*Maclurites bigsbyi dixonensis* (Ulrich))

Plattin, No. 27 (Ord.). S. Beckett Hill, Ste. Genevive County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, No. 3, p. 137, pl. 7, figs. 1–3, 1928.
Walker Museum 33422.

1970. *Maclurea bigsbyi* var. *dixonensis* Ulrich Plasto-plesiotype
(= *Maclurites bigsbyi dixonensis* (Ulrich))
Plattin, No. 26, (Ord.). S. Beckett Hill, Ste. Genevieve, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, No. 3, p. 137, pl. 7, fig. 6, 1928.
Walker Museum 25936.

832a. *Maclurea bigsbyi* var. *dixonensis* Ulrich Plasto-holotype
832b. (= *Maclurites bigsbyi dixonensis* (Ulrich))
Mohawkian (Ord.). Dixon, Illinois.
Ulrich, Geol. Minn., Vol. 3, pt. 2, p. 1039, 1897.

1956. *Maclurina manitobensis* (Whiteaves) Plasto-holotype
Trenton—Galena (Ord.). Black Island, Swampy Harbor, and Lake Winnipeg.
Whiteaves, Trans. Roy. Soc. Canada, Vol. 7, Sec. 4, p. 75, pl. 12; pl. 13, figs. 1–2, 1890.

1970. *Maclurites bigsbyi dixonensis* (Ulrich) Plasto-pleisotype
(See *Maclurea bigsbyi* var. *dixonensis* Ulrich)
Plattin, No. 26 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, No. 3, p. 137, pl. 7, fig. 6, 1928.
Walker Museum 25936.

1971. *Maclurites bigsbyi dixonensis* (Ulrich) 2 Plasto-plesiotypes
(See *Maclurea bigsbyi* var. *dixonensis* Ulrich)
Plattin, No. 27 (Ord.). S. Beckett Hill, Ste. Geneveive County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, No. 3, p. 137, pl. 7, figs. 1–3, 1928.
Walker Museum 33422.

832a. *Maclurites bigsbyi dixonensis* (Ulrich) Plasto-holotype
832b. (See *Maclurea bigsbyi* var. *dixonensis* Ulrich)
Mohawkian (Ord.). Dixon, Illinois.
Ulrich, Geol. Minn., Vol. 3, pt. 2, p. 1039, 1897.

3334. *Macrochilina blairi* Miller Holotype and 2 Paratypes
3334a. (= *Soleniscus? blairi* Miller)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 84, pl. 14, fig. 5, 1891. Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 694, pl. 14, fig. 5, 1892.

3930– *Macrodon blairi* Miller and Gurley 20 Cotypes
3935. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 11, pl. 2, fig. 19–24, 1896.

3905. *Macrodon facetus* Miller and Gurley 6 Cotypes
3906. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 10, pl. 1, fig. 14–16, 1896.

3907. *Macrodon pettisensis* Miller and Gurley 2 Cotypes
3908. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 10, pl. 2, fig. 17–18, 1896.

3846. *Megistocrinus ornatus* Miller and Gurley 2 Cotypes
3847. Hamilton group (Dev.). Clark County, Indiana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 42, pl. 2, figs. 15–17, 1895.

3869. *Metacoceras cavatiforme* Hyatt 3 Plesiotypes
3870. (Pennsylvanian). Kansas City, Missouri.
Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 326, pl. 11, figs. 5–7, 1894.

3998–4000. *Microcyclus blairi* Miller 7 Cotypes
Choteau limestone (Miss.). Sedalia, Missouri.
Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 261, pl. 9, figs. 27–28, 1894.

3960. *Microdon? eximia* (Miller and Gurley) Cotype
(See *Cypricardella eximia* Miller and Gurley)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 15, pl. 2, fig. 25, 1896.

3961. *Microdon? eximia* (Miller and Gurley) 3 Cotypes
(See *Cypricardella eximia* Miller and Gurley)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 15, pl. 2, fig. 25, 1896.

3263. *Microdon? gorbyi* Miller Holotype
(See *Cypricardella gorbyi* Miller)
Keokuk group (Miss.). Boonville, Missouri.
Miller, Adv. Sheet, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 92, pl. 20, figs. 6–7, 1891.

3786. *Modiolopsis corrugata* Miller and Faber 4 Cotypes
(= *Whiteavesia corrugata* (Miller and Faber))
Maysville—Corryville (Ord.). Cincinnati, Ohio.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 15, p. 79, pl. 1, fig. 1, 1892.

3881. *Modiolopsis modiolaris* (Conrad) 2 Plesiotypes
3882. (Cincinnatian) Cincinnati, Ohio?
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 149, fig. 17, 1874.

3790. *Modiolopsis pholadiformis* Hall Plesiotype
(= *Whiteavesia pholadiformis* (Hall))
Richmond (Ord.). Richmond, Indiana.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 282, 1874.

419. *Monotrypa magna* Ulrich 2 Plesiotypes
420. Plattin, No. 32 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Ulrich, Am. Mid. Nat., Vol. 11, No. 2, p. 129, 1928.

3785. *Monticulipora calceola* Miller and Dyer 104 Cotypes
(= *Leptotrypa calceola* (Miller and Dyer))
Maysville—Corryville (Ord.). Cincinnati, Ohio.

Miller and Dyer, Jour. Cincinnati Soc. Nat. Hist. Vol. 1, p. 26, pl. 1, figs. 11–11a, 1878.

4502. *Monticulipora molesta* Nicholson — Thin Section
Twitchell, Amer. Mid. Nat., Vol. 15, No. 6, pl. 29, fig. 10, 1934.

4520. *Monticulipora epidermata* Ulrich and Bassler — Thin Section
Twitchell, Amer. Mid. Nat., Vol. 15, No. 6, pl. 29, fig. 11, 1934.

3802. *Mourlonia worthenana* (Miller) — Holotype
(See *Murchisonia worthenana* Miller)
Niagaran—Racine (Sil.). Bridgeport, Illinois.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 5, p. 225, pl. 9, fig. 3, 1882.

3802. *Murchisonia worthenana* Miller — Holotype
(=*Mourlonia worthenana* (Miller))
Niagaran—Racine (Sil.). Bridgeport, Illinois.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 5, p. 225, pl. 9, fig. 3, 1882.

753. 785. *Myelodactylus bridgeportensis* Miller — 4 Cotypes
Niagaran—Racine Dolomite (Sil.). Chicago, Illinois.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol 3, p. 141, pl. 4, figs. 2a-c, 1880.

3924–3928. *Mytilarca jessieae* Miller and Gurley — 23 Cotypes
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 14, pl. 2, figs. 1–6, 1896.

3782. *Newlandia sarcinula* Fenton and Fenton — Holotype
(Altyn). S. Shoulder Spot Mt. Glacier National Park, Montana.
Fenton and Fenton, Jour. Geol., Vol. 39, No. 7, p. 685, pl. 7, figs. 1–2, 1931.

3029. *Notalacerta missouriensis* Butts — Topotype
(=*Collettosaurus missouriensis* (Butts))
(Upper Coal Measures) Kansas City, Missouri.
Butts, Kansas City Sci., Vol. 5, No. 2, p. 18, 1891. Charles W. Gilmore, Smithsonian Misc. Coll., Vol. 80, No. 3, p. 58, fig. 30, 1927.

1317. *Nucleocrinus venustus* Miller and Gurley — 2 Cotypes
Onondagan—Columbus limestone (Dev.). Columbus, Ohio.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 3, p. 63, pl. 6, figs. 28–30, 1893.

3213. *Orospira bigranosa* Ulrich — Plasto-holotype
Cotter, Missouri.

3920. *Orbiculoidea sampsoni* (Miller) — 3 Cotypes
(See *Discina sampsoni* Miller)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 80, pl. 13, figs. 10–12, 1891.

3326. *Orthis* (*Platystrophia*) *crassa* James — 2 Cotypes?
(=*Platystrophia crassa* (James))
Maysville (Ord.). Cincinnati, Ohio.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 20, 1874.

3307. *Orthis scovillei* Hall and Clarke 7 Cotypes
(= *Plectorthis* (*Austinella*) *scovillei* (Miller))
Hudson River group (Ord.). Lebanon, Ohio.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 5, p. 40, pl. 1, fig. 5, 1882.

360. *Orthoceras albersi* Faber and Miller 5 Cotypes
361. Trenton—Upper (Ord.). W. Covington, Kentucky.
1323. Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17,
1323a. p. 140, pl. 8, fig. 51–54, 1894.

1331. *Orthoceras byrnesi* Miller 67 Cotypes
3304. Maysville—Fairmount (Ord.). Cincinnati, Ohio.
Miller, Cincinnati Quart. Jour. Sci., Vol. 2, p. 126, fig. 13, 1875. Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 4, p. 319, pl. 8, fig. 8, 1881.

3305. *Orthoceras cincinnatiense* Miller Cotype
Hudson River Group (Ord.). Cincinnati, Ohio.
Miller, Cincinnati Quart., Jour. Sci., Vol. 2, p. 127, 1875. Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 4, p. 319, pl. 8, fig. 5, 5a, 1881.

353. *Orthoceras colleti* Miller Holotype
Pennsylvanian — (Upper Coal Measures). Kansas City, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 67, pl. 10, fig. 1, 1892. Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 321, pl. 10, fig. 1, 1894.

356. *Orthoceras duseri* Hall and Whitfield 3 Cotypes
(Cotypes of *Orthoceras fosteri* Miller)
Richmond—Waynesville (Ord.). Clinton County, Ohio.
Miller, Cincinnati Quart.Jour. Sci., Vol. 2, p. 127, 1875. Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 4, p. 319, pl. 8, figs. 7–7a, 1881.

351. *Orthoceras dyeri* Miller Plesiotype
Maysville—Corryville (Ord.). Cincinnati, Ohio.
Miller, Cincinnati Quart. Jour. Sci., Vol. 2, p. 125, fig. 11, 1875.

352. *Orthoceras dyeri* Miller 2 Cotypes
Maysville—Corryville (Ord.). Cincinnati, Ohio.
Miller, Cincinnati Quart. Jour. Sci., Vol. 2, p. 125, fig. 11, 1875. Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 3, p. 236, pl. 7, fig. 7, 1880.

356. *Orthoceras fosteri* Miller 3 Cotypes
(= *Orthoceras duseri* Hall and Whitfield)
Richmond—Waynesville (Ord.). Clinton County, Ohio.
Miller, Cincinnati Quart. Jour. Sci., Vol. 2, p. 127, 1875. Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 4, p. 319, pl. 8, fig. 7–7a, 1881.

1329. *Orthoceras harperi* Miller 22 Cotypes
1330. Maysville—Corryville (Ord.). Cincinnati, Ohio.
Miller, Cincinnati Quart. Jour. Sci., Vol. 2, p. 128, 1875. Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 4, p. 319, pl. 8, figs. 6–6a, 1881.

357. *Orthoceras ludlowense* Miller and Faber — 2 Cotypes
Trenton—upper (Ord.). Ludlow, Kentucky.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 139, pl. 7, figs. 1–2, 1884.

354. *Orthoceras mohri* Miller — 84 Cotypes
355. Richmond (Ord.). Versailles, Indiana.
Miller, Cincinnati Quart. Jour. Sci., Vol. 2, p. 124, fig. 10, 1875.

1328. *Orthoceras transversum* Miller — 34 Cotypes
Eden (Ord.). Cincinnati, Ohio.
Miller, Cincinnati Quart. Jour. Sci., Vol. 2, p. 129, 1875. Miller, N. A. Geol. Pal., p. 452, fig. 755, 1889.

3795. *Orthodesma cylindricum* Miller and Faber — 5 Cotypes
3796. (See *Cymatonota cylindrica* (Miller and Faber)
Waynesville (Ord.). Warren County, Ohio.
Miller, and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 22, pl. 1, figs. 1–4, 1894.

3788. *Orthodesma cymbula* Miller and Faber — 2 Cotypes?
(See *Rhytimya mickleboroughi* (Whitfield))
Maysville—Fairmount (Ord.). Cincinnati, Ohio.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 143, pl. 8, figs. 7–9, 1894.

3314. *Orthonychia boonvillensis* Miller — Holotype and Paratype
3314a. (See *Platyceras boonvillense* Miller)
Keokuk group (Miss.). Boonville, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 82, pl. 14, figs. 15–16, 1891.

1470. *Pachyphyllum websteri* Belanski — 2 Paratypes
1478. Shellrock—Mason City Substage (Dev.). Pachyphyllum zonule.
Shale Band near C. M. and St. Paul Depot, Nora Springs, Iowa.
Belanski, Am. Mid. Nat., Vol. 11, No. 5, p. 171, pl. 12, fig. 3, 1928.

3728a. *Paedumias transitans* Walcott — 7 Homeotypes
Kintzers Formation (late Eocambrian). Near Fruitville County, Pensylvania.

1953. *Paleophycus tubulare* Hall — Plasto-Plesiotype
Plattin, No. 15 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, No. 2, p. 126, pl. 1, fig. 5, 1928.

3952. *Palaeosolen occidentalis* Miller and Gurley — 2 Cotypes
3901. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 16, pl. 2, figs. 13–14, 1896.

3893. *Pasceolus claudei* Miller — 10 Cotypes
Maysville—Bellevue (Ord.). Near Maysville, Kentucky.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 6, fig. 3, 1874.

3310. *Pasceolus darwini* Miller — 5 Cotypes?
Miller, Cincinnati Quar. Jour. Sci., Vol. 1, p. 5, figs. 1–2, 1874.

3311. *Pentremites occidentalis* Miller — Holotype?
Kaskaskia group (Miss.). Black Hills region, Dakota.
Marked type in Miller Coll.

799. *Periechocrinus pyriformis* Wachsmuth and Springer — Cotype
(= *Periechocrinus urniformis* (Miller)
(See *Saccocrinus pyriformis* Miller)
Niagaran—Racine Dolamite (Silurian). Chicago, Illinois.
Miller, Jour. Cin. Soc. Nat. Hist., Vol. 5, p. 81, pl. 3, figs. 3, 3a, 1882.

799. *Periechocrinus urniformis* (Miller) — Cotype
(See *Periechocrinus pyriformis* Wachsmuth and Springer).
(See *Saccocrinus pyriformis* Miller)
Niagaran—Racine Dolamite (Sil.). Chicago, Illinois.
Miller, Jour. Cin. Soc. Nat. Hist., Vol. 5, p. 81, pl. 3, figs. 3, 3a, 1882.

4516. *Peronopora vera* Ulrich — Thin Section
Fairmount.
Twitchell, Amer. Mid. Nat., Vol. 15, No. 6, pl. 30, fig. 15, 1934.

4507. *Peronopora vera* Ulrich — Thin Section
Twitchell, Amer. Mid. Nat., Vol. 15, No. 6, pl. 29, fig. 6, 1934.

4509. *Peronopora vera* Ulrich — Thin Section
Between lamella.
Twitchell, Amer. Mid. Nat., Vol. 15, No. 6, pl. 30, fig. 13, 1934.

4515. *Peronopora vera* Ulrich — Thin Section
Twitchell, Amer. Mid. Nat., Vol. 15, No. 6, pl. 29, figs. 8–9, 1934.

3364. *Phialocrinus harii* (Miller and Gurley) — Plesiotype
(See *Aesiocrinus harii* Miller and Gurley)
(Pennsylvanian) Kansas City, Missouri.
Miller and Gurley, Jour. Cin. Soc. Nat. Hist., Vol. 13, p. 16, pl. 3, fig. 1, 1890.

4851. *Pholidops greenei* Miller and Gurley — 17 Cotypes
(Devonian) Charleston, Indiana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 48, pl. 3, fig. 16–21, 1897.

3312. *Phragmoceras missouriense* Miller — Holotype and 5 Paratypes
3312a. Chouteau limestone (Miss.). Pettis County, Missouri.
Miller, 17th Rep. Geol. Surv. Ind., p. 699, pl. 15, fig. 2, 1891.

3966. *Physetomya acuminata* Ulrich — Geno-holotype
Maysville—Fairmount (Ord.). Cincinnati, Ohio.
Ulrich, Geol. Surv. Ohio, Vol. 7, p. 693, pl. 49, fig. 12–14, 1893.

3313. *Pisocrinus campana* Miller — Holotype and 5 Paratypes
3313a. Niagara group (Sil.). Wabash, Indiana.
Miller, 17th Ann. Rep. Ind. Dep. Geol. Nat. Res., p. 642, pl. 11, fig. 4–5, 1892.

3883–3385. *Pisocrinus gemmiformis* Miller — 7 Cotypes
Niagaran group (Sil.). Osgood, Indiana.
Miller, Jour. Cin. Soc. Nat. Hist., Vol. 2, p. 113, pl. 9, figs. 6–6c, 1879.

3314. *Platyceras boonvillense* Miller Holotype and Paratype
3314a. (=*Orthonychia boonvillensis* Miller)
Keokuk group (Miss.). Boonville, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 82, pl. 14, fig. 15–16, 1891.

3892. *Platyceras missouriense* Miller Holotype
(=*Igoceras quincyense* (McChesney))
Burlington group (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 82, pl. 14, fig. 2, 1891.

3890. *Platyceras pettisense* Miller 2 Cotypes
3891. (=*Igoceras quincyense* (McChesney))
Burlington group (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 81, pl. 14, fig. 1, 1891.

3316. *Platycrinus acclivus* Miller Holotype and 2 Paratypes
3316a. Burlington group (Miss.). Sedalia, Missouri.
Miller, Bull. Geol. Surv. Mo., No. 4, p. 12, pl. 1, figs. 9–10, 1891.

3867. *Platycrinus aequalis* Hall Holotype
(=*Platycrinus batiola* Miller)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 22, pl. 3, figs. 1–2, 1891.

3858. *Platycrinus amabilis* Miller 3 Cotypes
3859. ? Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 19, pl. 2, fig. 9–10, 1891.

3817. *Platycrinus americanus* Owen and Shumard Marked Holotype
(=*Platycrinus broadheadi* Miller)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 21, pl. 2, fig. 15, 1891.

3867. *Platycrinus batiola* Miller Holotype
(See *Platycrinus aequalis* Hall)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Mo. Geol. Surv., Bull. No. 4, p. 22, pl. 3, fig. 1–2, 1891.

2184. *Platycrinus bozemanensis* Miller and Gurley, Holotype and Paratype
2184a. Burlington group (Miss.). Bozeman, Montana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 42, pl. 3, fig. 5, 1897.

3817. *Platycrinus broadheadi* Miller Marked Holotype
(See *Platycrinus americanus* Owen and Shumard)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 21, pl. 2, fig. 15, 1891.

3317. *Platycrinus carchesium* Miller Holotype
(See *Platycrinus pileiformis* Hall)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Missouri, Bull. No. 4, p. 23, pl. 3, figs. 6–7, 1891.

3862. *Platycrinus casula* Miller and Gurley — Holotype
Burlington (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 76, pl. 4, figs. 37–40, 1895.

4008. *Platycrinus chouteauensis* Miller — 3 Cotypes
4028. Chouteau limestone (Miss.). Sedalia, Missouri.
4029. Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 268, pl. 2, figs. 14–15, 1894.

4018. *Platycrinus clinatus* Miller and Gurley — 11 Cotypes
4020–4022. Chouteau limestone, (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 74, pl. 4, figs. 26–30, 1895.

4002. *Platycrinus colletti* Miller — 2 Cotypes
4023. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 268, pl. 2, figs. 16–17, 1894.

4011. *Platycrinus cortina* Miller and Gurley — 3 Cotypes
4024. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 5, p. 40, pl. 3, figs. 15–16, 1894.

2368. *Platycrinus discoideus* Owen and Shumard
2369. Holotype and 5 Paratypes
(= *Platycrinus pulchellus* (*pulcellus*) Miller)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Bull. Geol. Surv. Mo. No. 4, p. 11, pl. 1, fig. 7, 1891.

2185. *Platycrinus douglassi* Miller and Gurley — Holotype
(= *Dichocrinus douglassi* (Miller and Gurley)
Bridger Mts. (Miss.). Bozeman, Montana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 86, pl. 5, fig. 18–19, 1896.

3322. *Platycrinus excavatus* Hall — Holotype and 4 Paratypes
3322a. (= *Platycrinus sulcatus* Miller)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 16, pl. 2, fig. 2, 1891.

4009. *Platycrinus formosus* Miller and Gurley — 9 Cotypes
3805. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 72, pl. 4, figs. 20–21, 1895.

3318. *Platycrinus gorbyi* Miller — Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Mo. Bull. No. 4, p. 15, pl. 1, fig. 14, 1891.

3818. *Platycrinus hodgsoni* Miller and Gurley — Holotype
Burlington group (Miss.). Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 63, pl. 5, figs. 8–9, 1896.

3851. *Platycrinus illinoisensis* Miller and Gurley — 2 Cotypes
3852. Burlington group (Miss.). Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 62, pl. 5, figs. 5–7, 1896.

4016. *Platycrinus missouriensis* Miller and Gurley Holotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 73, pl. 4, figs. 22–23, 1895.

3319. *Platycrinus modestus* Miller and Gurley
3319a. Holotype and 9 Paratypes
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 77, pl. 4, figs. 43–45, 1895.

4017. *Platycrinus pettisensis* Miller and Gurley 4 Cotypes
4019. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 73, pl. 4, figs. 24–25, 1895.

3317. *Platycrinus pileiformis* Hall Holotype
(= *Platycrinus carchesium* Miller)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 23, pl. 3, figs. 6–7, 1891.

2368. *Platycrinus pulchellus* (*pulcellus*) Miller
2369. Holotype and 5 Paratypes
(See *Platycrinus discoideus* Owen and Shumard)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 11, pl. 1, fig. 7, 1891.

3843. *Platycrinus semifusus* Miller and Gurley 2 Cotypes
3844. Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 77, pl. 4, figs. 41–42, 1895.

3321. *Platycrinus sharonenesis* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 42, pl. 3, figs. 6–7, 1897.

3322. *Platycrinus sulcatus* Miller Holotype and 4 Paratypes
3322a. (See *Platycrinus excavatus* Hall)
Burlington group (Miss.). Sedalia, Missouri.
Miller, Geol. Surv. Missouri, Bull. No. 4, p. 16, pl. 2, fig. 2, 1891.

3323. *Platycrinus sulciferus* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 75, pl. 4, figs. 33–34, 1895.

3324. *Platycrinus tugurium* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 70, pl. 4, figs. 17–19, 1895.

3326. *Platystroma crassa* (James) 2 Cotypes?
(See *Orthis* (*Platystrophia*) *crassa* James)
Maysville (Ord.). Cincinnati, Ohio.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 20, 1874.

3307. *Plectorthis* (*Austinella*) *scovillei* (Miller),
7 Cotypes of S. A. Miller?
(See *Orthis scovillei* Hall & Clarke)

Hudson River group (Ord.). Lebanon, Ohio.
Miller, Jour. Cin. Soc. Nat. Hist., Vol. 5, p. 40, pl. 1, fig. 5, 1882.

3863. *Poteriocrinus altonensis* Miller and Gurley 2 Cotypes
3864. St. Louis (Miss.). Alton, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 62, pl. 4, figs. 3–4, 1895.

3327. *Poteriocrinus blairi* Miller and Gurley Holotype
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 61, pl. 4, figs. 1–2, 1895.

2186. *Poteriocrinus bozemanensis* Miller and Gurley Holotype
Bridger Mts. (Miss.). Bozeman, Montana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 82, pl. 5, figs. 10–11, 1896.

4014. *Poteriocrinus broadheadi* Miller & Gurley 6 Cotypes
4031. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 63, pl. 4, figs. 7–8, 1895.

2187. *Poteriocrinus douglassi* Miller & Gurley Holotype
(= *Decadocrinus douglassi* (Miller and Gurley)
Bridger Mts. (Miss.). Bozeman, Montana.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 10, p. 83, pl. 5, figs. 16–17, 1896.

3402. *Poteriocrinus porrectus* (Miller) Holotype
(See *Scaphiocrinus porrectus* Miller)
Keokuk group (Miss.). Crawfordsville, Indiana.
Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 652, pl. 7, fig. 2, 1892.

3392. *Poteriocrinus sampsoni* Miller & Gurley
3393. Holotype and 2 Paratypes
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 65, pl. 4, figs. 9–10, 1895.

1474. *Prismatophyllum oweni* Belanski Paratype and Metatype
1472. Shellrock—Nora Substage, Prismatophyllum zonule (Dev.). Rudd, Iowa.
Belanski, Am. Mid. Nat., Vol. 11, No. 5, p. 174, pl. 12, fig. 2, 1928.

1493. *Productella fragilis* Belanski Paratype
Rock Grove Substage—Shellrock, Productella faunule (Dev.), Rudd, Iowa.
Belanski, Am. Mid. Nat., Vol. 11, No. 5, p. 192, pl. 14, figs. 15, 17, 1928.

3942. *Productus blairi* Miller 44 Cotypes
3943. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 689, pl. 13, figs. 16–17, 1892.

1310. *Pterinea cincinnatiensis* Miller and Faber 12 Cotypes
Maysville-Fairmount (Ord.). Cincinnati, Ohio.

Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 25, pl. 1, figs. 11–12, 1894.

3394. *Pterinea rugatula* Miller and Faber 3 Cotypes and 4 Metatypes
3797.
3798. Maysville—Fairmount (Ord.). Cincinnati, Ohio.
Miller and Faber, Jour. Cin. Soc. Nat. Hist., Vol. 17, p. 26, pl. 1, figs. 18–19, 1894.

3329– *Pterinopecten sedaliensis* Miller 16 Cotypes
3329b. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets 17th Rep. Dept. Geol. Nat. Res. Ind., p. 93, pl. 20, figs. 8–9, 1891.

3789. *Ptilodictya (Stictopora) shafferi* Meek 4 Cotypes
(See *Arthropora shafferi* (Meek))
Maysville—Bellevue, Corryville (Ord.).
Meek, Proc. Acad. Nat. Sci. Phil., p. 317, 1872. Meek, Pal. Ohio Vol. 1, p. 69, pl. 5, figs. 1a-c, 1873.

3971– *Ptychospira plicata* (Miller) 3 Cotypes
3973. (See *Retzia plicata* Miller)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 316, pl. 9, figs. 29–31, 1894.

1587. *Rafinesquina minnesotensis* (Winchell) 2 Plasto-plesiotypes
1588. (See *Strophomena deltoidea* Owen)
Plattin, No. 40 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Owen, Geol. Expl. Iowa, Wisconsin and Ill., pl. 16, fig. 8, pl. 17, fig. 6, 1844. C. L. Fenton, Am. Mid. Nat., Vol. 11, No. 3, p. 130, pl. 2, fig. 8, 1928. Walker Museum 25508 and 25512.

3992. *Retzia circularis* Miller 14 Cotypes
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 316, pl. 9, fig. 32–34, 1894.

3971. *Retzia plicata* Miller
3972. (=*Ptychospira plicata* (Miller)) 9 Cotypes
3973. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 316, pl. 9, figs. 29–31, 1894.

3990. *Retzia triangularis* Miller 4 Cotypes
3991. (=*Hustedia triangularis* (Miller))
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 61, pl. 9, figs. 25–26, 1892.

4514. *Rhombotrypa quadrata* Chiro-plesiotype
Thin section
Twitchell, Amer. Mid. Nat., Vol. 15, No. 6, pl. 30, fig. 14, 1934.

3337. *Rhynchotrema increbescens* (Hall) 26 Cotypes
3337a. (See *Rhynchotreta quadriplicata* Miller)
Trenton group (Ord.). Paris, Kentucky.
Miller, N. A. Geol. Pal., p. 370, fig. 608, 1889.

3337. *Rhynchotreta quadriplicata* Miller — 26 Cotypes
3337a. (See *Rhynchotrema increbescens* (Hall))
Trenton group (Ord.). Paris, Kentucky.
Miller, N. A. Geol. Pal., p. 370, fig. 608, 1889.

3788. *Rhytimya mickleboroughi* (Whitfield) — 2 Cotypes
(=*Orthodesma cymbula* Miller and Faber)
Maysville—Fairmount (Ord.). Cincinnati, Ohio.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 143, pl. 8, figs. 7–9, 1894.

3338. *Rusophycus montanense* Miller? — 2 Cotypes?
Burlington group (Miss.). Bridger Mts., Montana.
Marked types in Miller's collection.

3398. *Saccocrinus marcouensis* Miller — 5 Plesiotypes
3399. Niagara group (Sil.). Bridgeport, Illinois.
Miller, Cincinnati Soc. Nat. Hist., Vol. 4, p. 167, pl. 4, figs. 1–1a, July 1881.

799. *Saccocrinus pyriformis* Miller — Cotype
(=*Periechocrinus urniformis* (Miller))
(=*Periechocrinus pyriformis* Wachsmuth and Springer)
Niagaran—Racine Dolamite (Sil.). Chicago, Ill.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 5, p. 81, pl. 3, figs. 3, 3a, 1882.

3339. *Scaphiocrinus boonvillensis* Miller — Holotype and 18 Paratypes
3339a. Keokuk group (Miss.). Boonville, Miss.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 37, pl. 5, figs. 1–2, 1891.

3402. *Scaphiocrinus porrectus* Miller — Holotype and Paratype
3403. (See *Poteriocrinus porrectus* Miller)
Keokuk group (Miss.). Crawfordsville, Ind.
Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 652, pl. 7, fig. 2, 1892.

3962. *Schizodus sedaliensis* Miller and Gurley — Holotype
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 17, pl. 2, fig. 15–16, 1896.

347–350. *Schizophoria meeki* Fenton and Fenton — Allotype and 8 Paratypes
Cedar Valley (Dev.). Profunda zonule? E. of Waverly, Iowa.
Fenton and Fenton, Am. Mid. Nat., Vol. 11, No. 5, p. 160, pl. 11, figs. 3–8, 1928.

3344. *Shumardocrinus concinnus* Miller and Gurley
3344a. — Holotype and Paratype
(=*Steganocrinus concinnus* Shumard)
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 41, pl. 2, figs. 7–10, 1895.

3334. *Soleniscus blairi* Miller — 2 Paratypes
(See *Macrochilinea blairi* Miller)
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 84, pl. 14, fig. 5, 1891.

3909. *Sphenotus sinuatus* Miller and Gurley 4 Cotypes
3910. Chouteau limestone (Miss.). Sedalia, Missouri.
3911. Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 9, pl. 2, figs. 29–30, 1896.
3345. *Spirifer approximatus erraticus* Belanski 2 Paratypes
1495. *Spirifer cardinalis* Belanski Paratype
Etonia Faunule, Mason City Substage—Shellrock (Dev.). 4 mi. S. E. of Nora Springs, Iowa.
Belanski, Am. Mid. Nat., Vol. 11, p. 201, pl. 16, figs. 23–30, 1928.
3347– *Spirifer varians* 3 Paratypes
3349. *Spirifer varians* Paratype
Spirifer varians Paratype
3350. *Spirifer varians fallox* Paratype
3351. *Spirifer varians flexuosus* 2 Paratypes
3947. *Spirorbis blairi* Miller and Gurley 2 Cotypes
3948. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 89, pl. 5, figs. 14–15, 1895.
3352. *Steganocrinus blairi* Miller and Gurley Holotype
Burlington group (Miss.). Sharon, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12, p. 35, pl. 2, fig. 21–22, 1897.
3344. *Steganocrinus concinnus* Shumard Holotype and Paratype
3344a. (See *Shumardocrinus concinnus* Miller and Gurley)
Burlington group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 41, pl. 2, figs. 7–10, 1895.
3353. *Steganocrinus sharonensis* Miller and Gurley
3353a. Holotype and Paratype
Burlington group (Miss.). Sharon, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 12 p. 32, pl. 2, figs. 10–12, 1897.
3853. *Stephanocrinus hammelli* Miller 2 Cotypes
Clinton—Osgood (Sil.). Near Big Creek P. O., Jefferson County, Indiana.
Miller, 17th Rep. Dept. Geol. and Nat. Res. Ind., p. 635, pl. 6, figs. 7–9, 1892.
3800. *Stephanocrinus osgoodensis* Miller 3 Cotypes
3813. Clinton—Osgood (Sil.). Osgood, Indiana.
3812. Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 2, p. 116, pl. 10, figs. 7–7a, 1879. Miller, 17th Rep. Dept. Geol. Nat. Res. Ind. p. 632, pl. 6, figs. 1–4, 1892.
3944– *Straparollus blairi* Miller 9 Cotypes
3946. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 696, pl. 15, fig. 3, 1892.
3963– *Straparollus missouriensis* Miller and Gurley 15 Cotypes
3965. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 11, p. 20, pl. 2, figs. 35–36, 1896.

812. *Streptelasma corniculum medium* Fenton
828. Paratype and 3 Metatypes
Plattin, No. 26 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, No. 3, p. 128, pl. 2, figs. 5–7, 1928.

1584. *Streptorhynchus neglecta* James 2 Plasto-plesiotypes
1585. (=*Strophomena neglecta* (James))
Richmond (Ord.). Blanchester, Ohio.
James, Paleotologist Vol. 5, p. 41, 1881. Fenton, Am. Mid. Nat. Vol. 11, No. 3–4, p. 157, pl. 8, figs. 8–9, 1928.

1586. *Streptorhynchus* (*Strophomena*) *vetusta*, James Plast-plesiotype
(=*Strophomena vetusta* (James))
Richmond (Ord.). Blanchester, Ohio.
James, Cin. Quart. Jour. Sci. Vol. 1, p. 241, 1874. Fenton, Am. Mid. Nat. Vol. 11, No. 3–4, p. 156, pl. 9, figs. 9–11, 1928.
Walker Museum 25545.

1499. *Stropheodonta cicatricosa* Belanski Paratype
Camarophoria Faunule, Mason City Substage—Shellrock (Dev.). Nora Springs, Iowa.
Belanski, Am. Mid. Nat., Vol. 11, No. 4, p. 189, pl. 14, figs. 11–14, 1928.

1573– *Strophomena auburnensis* Fenton Plasto-holotype,
1576. 2 Plasto-paratypes,
2 Plasto-allotypes
Auburn chert (Ord.). Auburn, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, No. 3–4, p. 148, pl. 9, figs. 1–3, 1928 May–July.
Walker Museum 25522, 25523, 25521, respectively.

1577. *Strophomena delicatula* Fenton
800. Plasto-holotype and Plasto-paratype
Decorah (Ord.). 2½ mi. w. of Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, Nos. 3–4, p. 155, pl. 9, figs. 4–6, 1928.
Walker Museum 25537 and 25538.

1578. *Strophomena delicatula* Fenton 2 Plasto-allotypes
Decorah (Ord.). 2½ mi. w. of Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, Nos. 3–4, p. 155, pl. 9, figs. 4-6, 1928.
Walker Museum 33400.

1587. *Strophomena deltoidea* Owen 2 Plasto-plesiotypes
(=*Ranfiesquina minnesotensis* (Winchell))
Plattin No. 40 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Owen, Geol. Expl. Iowa, Wisconsin & Illinois, pl. 16, fig. 8, pl. 17, fig. 6, 1844. Fenton, Am. Mid. Nat. Vol. 11, p. 130, pl. 2, fig. 8, 1928.
Walker Museum 25508 and 25512.

1588. *Strophomena deltoidea* Owen — Plasto-plesiotype
(= *Rafinesquina minnesotensis* (Winchell))
Upper Plattin (Ord.). Gabouri Creek, near Ste. Genevieve, Mo.
Owen, Geol. Expl. Iowa, Wisconsin and Illinois, pl. 16, fig. 8, pl. 17, fig. 6, 1844.

1580. 1581. *Strophomena dignata* Fenton — Plasto-paratype, Plasto-holotype and 2 Plasto-allotypes
1594. Decorah (Ord.). 2½ mi. w. of Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, Nos. 3–4, p. 151, pl. 10, figs. 3–5, 1928.
Walker Museum 25532, 25533, 25535, respectively.

1582. 1583. *Strophomena exigua* Fenton — Plasto-holotype and Plasto-paratype
Plattin No. 41 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat. Vol. 11, Nos. 3–5, p. 152, pl. 10, fig. 6, 1928.
Walker Museum 25956, 25957.

4752–4755. *Strophomena filitexta* Meek — 5 Plasto-cotypes
(See *Strophomena neglecta* (James))
Black River (Ord.). Middleville, New York.
Meek, Pal. Ohio, Vol. 1, p. 83, pl. 6, fig. 5, 1873. Amer. Museum Natural History 702/1

1570. 1571. *Strophomena inconsueta* Fenton — 2 Plasto-holotypes and Plasto-paratype
Plattin No. 16 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, Nos. 3–4, p. 154, pl. 10, fig. 2, 1928.
Walker Museum 25987, 25989.

1567–1569. *Strophomena musculosa* Fenton — Plasto-holotype, 2 Plasto-allotypes and 2 Plasto-paratypes
1572. Decorah (Ord.). Fountain, Minn.
Fenton, Am. Mid. Nat., Vol. 11, Nos. 3–4, p. 153, pl. 8, fig. 6–7, 1928.
Walker Museum, 25524, 25525, 25527.

4752–4755. *Strophomena neglecta* (James) — 5 Plasto-cotypes
(See *Strophomena filitexta* Meek)
Black River (Ord.). Middleville, New York.
Foerste, Bull. Sci. Lab. Denison Univ., Vol. 17, pl. 5, figs. 1, 3; pl. 7, fig. 5; pl. 9, fig. 1; pl. 11, fig. 10; 1912.
Meek, Pal. Ohio, Vol. 1, p. 83, pl. 6, fig. 5, 1873.

1584. 1585. *Strophomena neglecta* (James) — 2 Plasto-plesiotypes
(See *Streptorhynchus neglecta* James)
Richmond (Ord.). Blanchester, Ohio.
Fenton, Am. Mid. Nat., Vol. 11, Nos. 3–4, p. 157, pl. 8, figs. 8, 9, 1928.

James, Pal. Vol. 5, p. 41, 1881.
Walker Museum 25544.

1562–1566. *Strophomena plattinensis* Fenton — Plasto-allotype, 4 Plasto-paratypes and Plasto-holotype
1595. Plattin, No. 41 (Ord.). S. Beckett Hill, Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, Nos. 3–4, p. 149, pl. 10, figs. 7–9, 1928.
Walker Museum 25983, 25501, 25514, 25988.

1586. *Strophomena vetusta* (James) — Plasto-plesiotype
(See *Streptorhynchus* (*Strophomena*) *vetusta* James)
Upper Plattin (Ord.). Gabouri Creek, near Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, Nos. 3–4, p. 156, pl. 9, figs. 9–11, 1928.
Walker Museum 25545.

1589. *Strophomena winchelli* Hall and Clarke — Plasto-plesiotype
Upper Plattin (Ord.). Gabouri Creek, near Ste. Genevieve County, Missouri.
Fenton, Am. Mid. Nat., Vol. 11, Nos. 3–4, p. 150, pl. 9, fig. 8, 1928.
Walker Museum 25513.

3355. *Strotocrinus blairi* Miller and Gurley — Holotype
Burlington Group (Miss.). Sedalia, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 48, pl. 2, fig. 24, 1895.

3356. *Strotocrinus ornatus* Miller and Gurley — Holotype
Burlington group (Miss). Burlington, Iowa.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 30, pl. 2, figs. 12–14, 1896.

3848–3849. *Synbathocrinus illinoisensis* Miller and Gurley — Holotype and 6 Cotypes
Burlington group (Miss.). Adams County, Illinois.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 8, p. 53, pl. 3, figs. 29–31, 1896.

3886. *Technophorus cincinnatiensis* Miller and Faber — Holotype
Eden—Economy (Ord.). Cincinnati, Ohio.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 17, p. 147, pl. 8, figs. 15–16, 1894.

3987–3989. *Terebratula occidentalis* Miller — 3 Cotypes
(See *Dielasma occidentalis* (Miller))
Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, Adv. Sheets, 18th Rep. Dept. Geol. Nat. Res. Ind., p. 59, pl. 9, figs. 10–13, 1893.

3357. *Trigonia stiebeli* Miller — Holotype
(Cretaceous.). S. E. Arizona.
Miller, Jour. Cincinnati Soc. Nat. Hist., Vol. 4, p. 259, pl. 6, fig. 1, Oct. 1881.

3358. *Troostocrinus neglectus* Miller — Holotype?
St. Louis group (Miss.). Washington County, Indiana.

3194–1. *Whipplella cuneiformis* Holland Paratype
Nineveh limestone (Permian).
Limestone Hill, Wood County, West Virginia. Holland, Ann. of Carnegie Mus., Vol. 22, p. 344, pl. 25, fig. 5, 1934.

3194–2. *Whipplella depressa* Holland Paratype
Nineveh limestone (Permian)
Limestone Hill, Wood County, West Virginia.
Holland, Am. of Carnegie Mus., Vol. 22, p. 345, pl. 25, fig. 7, 1934.

3194–3. *Whipplella magnitata* Holland Paratype
Nineveh limestone (Permian). Nineveh, Greene County, Pennsylvania.
Holland, Ann. of Carnegie Mus., Vol. 22, p. 346, pl. 25, fig. 2, 1934.

3194–6. *Whipplella ninevehensis* Holland Paratype
Nineveh limestone (Permian). Nineveh, Greene County, Pennsylvania.
Holland, Ann. of Carnegie Mus., Vol. 22, p. 347, pl. 25, fig. 3, 1934.

3194–4. *Whipplella ovata* Holland Paratype
Nineveh limestone (Permian). Nineveh, Greene County, Pennsylvania.
Holland, Ann. of Carnegie Mus., Vol. 22, pl. 25, fig. 4, p. 348, 1934.

3194–5. *Whipplella parvula* Holland Paratype
Nineveh limestone (Permian). Nineveh, Greene County, Pennsylvania.
Holland, Ann. of Carnegie Mus., Vol. 22, pl. 25, fig. 6, p. 347, 1934.

3786. *Whiteavesia corrugata* (Miller and Faber) 5 Cotypes
(See *Modiolopsis corrugata* Miller and Faber)
Maysville—Corryville (Ord.). Cincinnati, Ohio.
Miller and Faber, Jour. Cincinnati Soc. Nat. Hist., Vol. 15, p. 79, pl. 1, fig. 11, 1892.

3790. *Whiteavesia pholadiformis* (Hall) Plesiotype
(See *Modiolopsis pholadiformis* Hall)
Richmond (Ord.). Richmond, Indiana.
Miller, Cincinnati Quart. Jour. Sci., Vol. 1, p. 282, 1874.

3362. *Woodocrinus pocillum* (Miller) 14 Paratypes?
(See *Zeacrinus pocillum* Miller)
Keokuk group (Miss.). Boonville, Missouri.
Miller, Bull. Geol. Surv. Mo., No. 4, p. 28, pl. 4, figs. 1–2, 1891.

3359. *Zaphrentis calyculus* Miller 56 Cotypes
3359a. Chouteau limestone (Miss.). Pettis County, Missouri.
Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 620, pl. 1, figs. 13–14, 1892.

3916. *Zaphrentis chouteauensis* Miller 17 Cotypes
3917. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 620, pl. 1, figs. 11–12, 1892.

3940. *Zaphrentis tantilla* Miller 32 Cotypes
3941. Chouteau limestone (Miss.). Sedalia, Missouri.
Miller, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 621, pl. 1, Figs. 23–24, 1892.
3360. *Zaphrentis tenella* Miller Holotype and 32 Paratypes
3360a. Chouteau limstone (Miss.). Sedalia, Pettis County, Missouri.
Miller, Adv. Sheets, 17th Rep. Dept. Geol. Nat. Res. Ind., p. 11, pl. 1, figs. 17–18, 1891.
3861. *Zeacrinus blairi* Miller and Gurley Holotype
Keokuk group (Miss.). Boonville, Missouri.
Miller and Gurley, Ill. State Mus. Nat. Hist., Bull. No. 7, p. 66, pl. 4, figs. 5–6, 1895.
3361. *Zeacrinus commaticus* Miller 44 Paratypes?
Keokuk group (Miss.). Boonville, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 36, pl. 5, figs. 10–11, 1891.
3362. *Zeacrinus pocillum* Miller 14 Paratypes?
(See *Woodocrinus pocillum* Miller)
Keokuk group (Miss.). Boonville, Missouri.
Miller, Geol. Surv. Mo., Bull. No. 4, p. 28, 1891.

Pollen

In recent years there has been increasing interest taken in pollen. This has been in part due to the effects of pollen grains on hayfever sufferers, and in part to the fact that the more resistant pollen grains are often well preserved in peats and other natural deposits where the other remains are so changed as to be unrecognizable. The investigations of peats are going on all over the world, especially in regions which were glaciated in the Pleistocene, and from these studies we are learning much about past plant assembleges and distributions as well as past climates. Wodehouse in his new book "Pollen Grains" discusses the history of pollen studies, pollen not having been seen in detail until 1665 altho known to exist as a sort of dust. Methods of collecting and preparing fresh pollens for study are given. A chapter by G. Erdtman takes up fossil pollens and "Pollen Statistics." A discussion of atmospheric pollen leads naturally to hayfever. Then follows a discussion of characters of pollen grains. The major part of the book is devoted to a classification of pollen grains. A master key takes some 8 pages. The classification begins with the fossil pollens of the Cycadofilicales with some 11 different pollen grains described. The Cordaitales and Bennettitales are also included. The living Gymnosperms are next, covering 84 pages. The Angiosperms fill the rest of the book. A glossary, bibliography and index close the book.

This excellent classification of pollen grains should find a wide open field. Certainly botantists need it as well as all paleobotantists who are working on the younger rocks. As far as I know it is the only book bringing together descriptions of pollen grains. Its value is increased by the numerous careful illustrations. My only regret is that it could not tell us more about the fossil pollen grains, many of which require an especial technique to free them from the rocks or coal where they are preserved.—Willard Berry.

Pollen Grains, by R. P. Wodehouse. xvi+574 pp. New York, The McGraw-Hill Book Co. 1935.

STUDIES IN NOCTURNAL ECOLOGY, V.

An Experiment in Conducting Field Classes at Night[1]

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The chief purpose of this report is to suggest the value of incorporating night field trips into the regular schedule of classes in Animal Ecology. This is predicated upon the belief that instruction should reflect the gains made by research in any given field. Secondly, since the data taken are of interest, a part are given here as they add to our meager store of information upon nocturnal animals, the importance of which has been cited previously by Allee (1927).

METHOD

The locality chosen was a climax beech-sugar maple-wood frog association in northern Indiana. The authors were familiar with the forest in both the nocturnal and diurnal phase, the area having been studied irregularly since 1927. Preliminary details were arranged in the afternoon before regular class work had started. In this work white paint, strips of white cloth or paper squares were used to mark out a series of trails. Following the methods employed earlier (Park, Lockett and Myers, 1931), appropriate observation stations were established, e. g. logs and stumps, usually well decayed and bearing a variety of fungi, Mycetozoa, et cetera. When establishing the trails, any animals which could be observed without destruction of their habitat niches, were marked with paint. For this purpose a fast-drying mixture was made up by dissolving aluminum base in banana oil (Baer's Klondike Paint).

[1]It is with pleasure we acknowledge the enthusiasm of the students co-operating in this joint field trip between the classes in Animal Ecology of the two Universities; our indebtedness to Professor W. C. Allee for criticism throughout the conception of the project; and to the many specialists who, by their presence in the field, made subsequent identification of animals possible, e. g., W. J. Gerhard (Hemiptera), Emil Liljeblad (Coleoptera), D. C. Lowrie (Araneida). C. H. Seevers (Coleoptera), Mary Talbot (Formicidae), R. L. Wenzel (Coleoptera) and A. B. Wolcott (Cleridae).

After these preliminaries were completed the group was divided into two observation units of ten to twelve students each and examination of the stations was begun shortly after dusk. The trails were run alternately by each group hourly, until shortly after dawn. Both gasoline lantern and electric torches were used, and full notes taken as to kind of animal, number to be observed at a station, position and activity (feeding, walking, copulating), and time of observation for each station throughout the night. Simultaneously with the running of the trails physical data were also compiled, viz. light intensity, air and soil temperature, rate of evaporation and relative humidity.

RESULTS

Since most of the data taken show at least an apparent correlation with the periodic change in the physical influences measured, the light intensity during dusk and dawn is given in tabular form (Table I). The more commonly measured influences (temperature, relative humidity, evaporation rate)

TABLE I

LIGHT INTENSITY IN FOOT CANDLES

(Weston Illuminometer: May 25–May 26)

	Unobstructed Sky		*Under Forest Canopy*
DUSK			
5:15 P. M.	4000	5:10 P. M.	600
5:30 "	3200	5:25 "	450
5:45 "	3000	5:40 "	400
6:00 "	2400	5:55 "	400
6:15 "	2000	6:10 "	300
6:30 "	1800	6:25 "	280
6:45 "	1200	6:40 "	120
7:00 "	400	6:55 "	72
7:15 "	400	7:10 "	54
7:55 "	84	8:00 "	12
8:20 "	6	8:25 "	0
DAWN			
4:45 A. M.	2	4:55 A. M.	0
5:00 "	4	5:10 "	1
5:02 "	6	5:13 "	2
5:04 "	8	5:23 "	6
5:05 "	10		
5:06 "	12		
5:16 "	34		
5:18 "	40		
5:19 "	46		
5:20 "	50		
5:45 "	400		
6:30 "	620		

(Central Daylight Saving Time)

are intimately associated with the fall and rise in illumination, and as they have been discussed previously (Park, *et al.*, *loc. cit.*) in nocturnal work, need no further elaboration. With respect to these physical measurements, however, it should be kept in mind that in the case of species in which an inherent nocturnal activity has been demonstrated, the releasing stimulus is not a direct consequence of the operative nocturnal influences, or if it is then the elucidation awaits further experimentation.

With respect to the animals observed, little attempt was made to mark or take data upon those forms which could not be determined with precision in the field, or which could not be certainly identified later from collections made for this specific purpose. Despite this necessary limitation of the group's work, the number of species discerned to be active during the night proved surprisingly large. Some few forms were out in relatively great numbers, and these are treated in detail later; however, since lists of nocturnally active animals are so few in comparison with the diurnal fauna, the following table (Table II) gives the species which were positively identified and found to be active during the night, that is, in activity away from their diurnal niches of concealment.

TABLE II

Nocturnal Constituents of the Climax Forest

Animal Observed	Where Active	Bibliographic Citation Relevant to Species Nocturnalism
RODENTIA:		
Peromyscus leucopus noveboracensis	Floor	Johnson, 1926
HYMENOPTERA:		
Formicidae	Log and Stump	Flint, 1914
Lasius niger americanus		McCook, 1877
Aphaenogaster fulva picea		Park, Lockett and Myers, 1931
Aphaenogaster tenneeseensis		
Camponotus caryae		
Camponotus herculeanus pennsylvanicus		
COLEOPTERA:		
Carabidae	Floor, Log and Stump	Champlain & Kirk, 1910
Pterostichus adoxus		Chapman, et al, 1926
Calathus gregarius		Floersheim, 1906
Galerita janus		Garnett, 1920
Pinacodera limbata		Kirchner, 1927
Chlaenius aestivus		Oertel, 1924
		Park, et al, 1931
		Scott, 1932
		Seeman, 1928

TABLE II—(Continued)

NOCTURNAL CONSTITUENTS OF THE CLIMAX FOREST

ANIMAL OBSERVED	WHERE ACTIVE	BIBLIOGRAPHIC CITATION RELEVANT TO SPECIES NOCTURNALISM
COLEOPTERA—(Continued:)		
Staphylinidae	Cut Stump Surfaces	Park, et al, 1931
Conosoma crassum		
Erchomus ventriculus		
Erotylidae	Fomes applanatus	Park, et al, 1931
Megalodacne heros	(Feeding and copulating)	Park and Sejba, 1935
Nitidulidae	Fungi, Sugaring solution and plasmodia	Park, et al, 1931
Glischrochilus fasciatus		
Glischrochilus sanguintolentus		
Cucujiidae	Stump surfaces and plasmodia	
Brontes dubius		
Laemophlaeus fasciatus		
Laemophlaeus testaceus		
Temnochilidae	Logs and Stumps;	
Tenebroides corticalis	Fungi and plasmodia	
Tenebroides laticollis		
Cleridae	Stacked Wood	
Enoclerus nigripes		
Cisidae	Fungi	
Cis fuscipes		
Elateridae	Logs and Stumps	
Melanotus communis		
Melanotus decumanus		
Tenebrionidae	Logs and Stumps	Park, et al, 1931
Alobates pennsylvanica	Fomes applanatus	Park and Keller, 1932
Boletotherus cornutus	(Feeding and copulating)	
Diaperis maculata	Fungi	
Hoplocephala bicornis	Fungi	
Melandryidae		Park, et al, 1931
Melanodrya striata	Cut log surfaces	
Penthe obliquata	Fungi	
Penthe pimelia	Fungi	
Scarabaeidae		
Cleotus aphodiodes	Stacked Wood	
Phyllophaga species	Feeding on foliage of shrub stratum	Davis, 1916
Serica sericea		Forbes, 1907, 1916
Serica parallela	Feeding on foliage of shrub stratum	Sanders and Fracker, 1916
		Schwarz, 1893
Cerambycidae		
Leptostylus aculifer	Stacked Wood	
HETEROPTERA:		
Aradidae	Logs and Stumps, Fungi	
Aradus crenatus		
Aradus implanus		
Aradus quadrilineatus		
Pentatomidae		
Menecles insertus	Foliage and bark of shrub and tree strata	

TABLE II—(Continued)

NOCTURNAL CONSTITUENTS OF THE CLIMAX FOREST

ANIMAL OBSERVED	WHERE ACTIVE	BIBLIOGRAPHIC CITATION RELEVANT TO SPECIES NOCTURNALISM
ORTHOPTERA:		Allard, 1930
Ceuthophilus latens	Floor	Haber, 1920
Parcoblatta pennsylvanica	Logs and Stumps	Lutz, 1932
		Park and Keller, 1932
		Park, et al, 1931
		Rockwood, 1925
		Turner, 1915
LEPIDOPTERA:		Balfour-Brown, 1925, 1933
Noctuid larvae and adults	Log and Stump, at sugaring solutions	Brower, 1930
		Rau and Rau, 1929
		Stanley, 1932
DIPLOPODA:		
Spirobolus marginatus	Log and Stump	Park, 1935
		Park, et al, 1931
GASTROPODA:	Log and Stump	Allard, 1931
Agriolimax campestris		Boycott, 1934, p. 9
Anguispira alternata		Park, et al, 1931
		Van Cleave, 1931
ARANEIDA:		
Dictynidae		
Amaurobius bennetti	In web	
Clubionidae	Logs and Stumps	
Clubiona riparia		
Clubiona pallens	Copulating 1:00 A.M.	
Thomisidae		
Xysticus ferox	Logs and Stumps	
Agalenidae		
Coras medicinalis	Logs and Stumps	
Pisauridae		
Dolomedes tenebrosus	Logs and Stumps	
Lycosidae		
Schizocosa crassipes	Logs and Floor	
Attidae		
Wala mitrata	Herbaceous Stratum	

The above list of some fifty species represents but a small portion of the animals found active during the night, and does not include the abundant phalangids, centipedes *et cetera* remaining undetermined. It will be noted that these forms found usually under bark and mold during the day are nocturnal constituents of the community. In these species, three phyla (Mollusca, Arthropoda, Chordata) are represented and the greatest number of species are found in the largest group, the arthropods, and particularly in the largest order, the beetles.

Promptly at dusk the majority of the nocturnal forms moved out of their diurnal hibitat niches, e. g. log and leaf mold chiefly, and began their nightly activity. The mycetophagous forms (Erotylidae, Nitidulidae, Cucujiidae, Temnochilidae, Tenebrionidae, Melandryidae) were to be observed feeding upon the bracket and other fungi, as well as on the plasmodia of Mycetozoa and in some cases on the sap exudates and artificially prepared sugaring solutions smeared on certain stumps and trees; carnivorous forms (Carabidae, Staphylinidae, Araneida) began their nightly hunt for prey, while the herbivores left the leaf mold at the tree bases and in the mold to ascend the tree trunks and feed on foliage of shrub and tree stratum (Pentatomidae, Serica and Phyllophaga, *et al*). The pentatomid, *Menecles insertus*, proved especially instructive by illustrating the principle of vertical migration. By 9:10 P. M. these bugs were crawling from beneath the leaf mold at the bases of stump and tree and beginning their night ascent into higher strata. They appeared in great numbers throughout the night, and by midnight were from eight to fifteen feet or more up on the tree trunks and foliage. By 3:20 A. M. the pentatomids were moving down the trunks, and this downward movement continued until by 4:23 A. M. they were on the average from six to eight feet above the floor. At 5:00 A. M. the stragglers were two to four feet from the floor, but the majority had crawled once more under the floor mold and debris.

The data with respect to *Menecles insertus* checks with similar findings of Sanders and Shelford (1922) who showed similar vertical movements up and down of diurnal species during the day, and these results are also perfectly compatible with the fluctuations in numbers of nocturnal constituents as previously demonstrated by Chapman, *et al* (1926), Park *et al* (1931), Park and Keller (1932), Park and Sejba (1935) and Carpenter (1935). To illustrate this general, sustained nocturnal activity, Table III (*see* page 52) has been prepared.

The data shown represents the numbers of active individuals of several typical animals as observed by the unit making the trails at a given time, and consequently represent *indices* of activity rather than a quantitative estimate of such activity as has been demonstrated in work with *Megalodacne heros* under rigid experimental and field conditions (Park and Sejba, 1935). For this reason they understate the activity, since

many individuals undoubtedly escaped observation, or were adversely stimulated by the approaching lights and sought temporary cover.

TABLE III

ACTIVITY OF REPRESENTATIVE NOCTURNAL ANIMALS

TIME	NUMBER OF INDIVIDUALS DISCERNED TO BE ACTIVE FROM THE FIRST EVENING RECORD TO THE LAST OBSERVED RECORD BEFORE RETIRING. MARKED ANIMALS				
	Parcoblatta pennsylvanica	*Ceuthophilus latens*	*Spirobolus marginatus*	*Polygyra thyroides*	*Anguispira alternata*
(First Trip):					
9:00 P. M.	1				
9:20 "	1				
9:25 "	1	1	2		1
9:35 "			1		
9:40 "	1		1		
9:45 "	1		1		
9:47 "			1		
9:50 "		5	1	1	
(Second Trip):					
10:40 P. M.	1				
10:50 "			1	1	
11:00 "		1			1
11:15 "		1	4		
11:25 "			1	4	1
11:30 "			1	1	
11:35 "	1	1	6		
(Third Trip):					
2:01 A. M.		1			
2:09 "	2				
2:12 "			2	1	
2:17 "				1	
2:19 "	1				
2:21 "					1
2:25 "			2		
2:30 "			1	1	1
2:33 "	1				
2:37 "				2	
2:38 "			1		
2:40 "			1	2	
2:42 "			1		
2:52 "			4	1	
2:54 "	1	1	3		1
3:00 "			1	4	
(Fourth Trip):					
3:25 A. M.			1		
3:30 "			1		
3:45 "			1	1	1
4:05 "			1		
4:35 "			1		
(Fifth Trip): (Dawn)					
4:50 A. M.			1	1	1
5:00 "		2			1

The same general activity may be shown for many other forms, for example the pentatomids, *Menecles insertus*, the spiders, which were active from the first trip (9:00 P. M. to 4:15 A. M.), and for the spotted slug, *Philomycus carolinensis*. The latter gave probably the most abundant and typical picture of nocturnal activity, since the individuals were constantly active in numbers from 9:25 P. M. to 5:05 A. M.; however, the marking of individuals failed as the slugs secreted mucous after being marked and in a few minutes the paint had been swept off of the animal.

Finally, the copulation of many species was observed, in particular in *Boletotherus cornutus*, *Megalodacne heros* and *Clubiona pallens* Hentz.

SUMMARY

Night field work, in courses dealing with the ecology of animals, has been demonstrated to work efficiently, and a provisional plan of operation is given. In night trips emphasis is placed upon certain important features which otherwise would remain unknown, or but vaguely realized, namely, (1) the large and varied number of nocturnal animals, both as to species and individuals, (2) the distinctness or integrity of these nocturnal forms, (3) the phenomenon of vertical movements (inter-, and intra-stratal), (4) the quiescent or sleeping diurnal constituents, and (5) the lack of knowledge concerning the nocturnal fauna, and hence the opportunity for effective research.

The data taken may be summarized as follows: light intensity through dusk and dawn are given in foot-candles; an extensive list of species found active is presented, together with place of activity and relevant bibliographic citations; the abundant and typical forms are dealt with in a table which demonstrates their sustained nocturnal activity, and the vertical migration of the pentatomid bug, *Menecles insertus*, is described.

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THE DESMIDS OF FLORIDA

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The desmids of Florida have never been specially studied, although algologists have listed some of the numerous species from time to time since Bailey (1851, 1855) gave the first known account. Wolle (1892) lists 92 desmids from Florida either found by him or previously reported by Wood or Bailey. Johnson (1894, 1895) reports a few additional species and varieties from the state. The most comprehensive list published to date is that of Borge (1909), who lists one hundred and eight species, varieties, and forms for the state.

The list in the present paper consists of a hundred and forty species, varieties, and forms which have been collected by the writer and identified during the summer quarters of 1932 to 1934 at the Ohio State University. Of these sixty-one are new records for the state.

Collecting has been done in August, December, and April. The desmid flora shows marked seasonal variations, so that to secure a fairly complete knowledge of all the species it will be necessary to make collections throughout the year.

The writer wishes to express his appreciation to those who have aided him so materially in this study, especially to Dr. L. H. Tiffany, E. H. Ahlstrom, and C. E. Taft of the Botany Department of the Ohio State University.

The list of species follows, arranged in the order commonly used by workers on desmids.

**Gonatozygon aculeatum* var. *gracile* Grönblad.
* " *pilosum* Wolle.
Netrium digitus (Ehrenberg) Itzigsohn & Rothe.
* " *interruptum* (Brébisson) Luetkemueller.
Penium libelulla var. *interruptum* W. & G. S. West.
" *minutum* f. *major* Lundell.
Closterium archerianum Cleve.
* " *attenuatum* Ehrenberg.
* " *costatum* Corda.
* " *didymotocum* Corda.
* " *kuetzingii* Brébisson.
* " *leibleinni* Kuetzing.

*New record for Florida.

**Closterium pritchardianum* Archer.
* " *ralfsii* var. *hybridum* Rabenhorst.
* " *regulare* Brébisson.
" *setaceum* Ehrenberg.
" *venus* Kuetzing.
Docidium undulatum Bailey.
Pleurotaenium nodosum (Bailey) Lundell.
" *trochiscum* W. & G. S. West.
Tetmemorus brebissonii (Meneghini) Ralfs.
**Euastrum ansatum* Ralfs.
* " *attenuatum* Wolle.
" *evolutum* W. & G. S. West.
" *humerosum* Ralfs.
" *insigne* Hassall.
**Netrium intermedium* Cleve.
" *oblongum* (Greville) Ralfs.
" *pinnatum* Ralfs.
" *ventricosum* Lundell.
" *verrucosum* Ehrenberg.
* " *verrucosum* var. *planctonicum* W. & G. S. West.
* " *wollei* Lagerheim.
**Micrasterias abrupta* W. & G. S. West.
* " *alata* Wallich.
" *americana* (Ehrenberg) Ralfs.
" *apiculata* var. *fimbriata* (Ralfs) Nordstedt.
* " *apiculata* var. *fimbriata* f. *spinosa* Bissett.
" *arcuata* var. *gracilis* W. & G. S. West.
" *arcuata* var. *expansa* (Bailey) Nordstedt.
* " *arcuata* f. *intermedia* Nordstedt.
* " *conferta* Lundell.
* " *conferta* var. *hamata* Wolle.
" *denticulata* Brébisson.
" *depauperata* var. *kitchelli* (Wolle) W. & G. S. West.
* " *floridensis* n. sp.
" *foliacea* Bailey.
* " *jenneri* Ralfs.
" *laticeps* Nordstedt.
" *mahabuleshwarensis* Hobson.
* " *muricata* (Bailey) Ralfs.
* " *murrayi* W. & G. S. West.
" *pinnatifida* (Kuetzing) Ralfs.
Micrasterias radiata Hassall.
* " *ranoides* n. sp.
" *ringens* var. *serrulata* Wolle.
" *sol* (Ehrenberg) Kuetzing.
* " *sol* var. *ornata* Nordstedt.
* " *sol* var. *swainii* (Hastings) W. & G. S. West.
* " *torreyi* Bailey.
" *truncata* (Corda) Brébisson.

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*New record for Florida.

Cosmarium amoenum Brébisson.
* " *brebissonii* Meneghini.
" *commissurale* Brébisson.
" *connatum* Brébisson.
" *granatum* Brébisson.
* " *isthmium* W. West.
* " *ochthodes* Nordstedt.
" *ornatum* Ralfs.
* " *orthogonum* Delponte.
* " *ovale* Ralfs.
* " *ovale* var. *subglabrum* W. & G. S. West.
" *portianum* Archer.
" *pyramidatum* Brébisson.
* " *regnesi* Reinsch.
* " *usmense* Skuja.
Xanthidium antilopaeum Kuetzing.
" *antilopaeum* var. *minneapoliense* Wolle.
" *antilopaeum* var. *polymazum* Nordstedt.
* " *antilopaeum* var. *triquetrum* Lundell.
Xanthidium armatum var. *cervicorne* W. & G. S. West.
" *cristatum* Brébisson.
" *subhastiferum* W. West.
Arthrodesmus convergens Ehrenberg.
" *incus* var. *longispinus* Eichler & Raciborski.
" *octocornis* Ehrenberg.
**Staurastrum arcuatum* Nordstedt.
* " *arctiscon* var. *glabrum* W. & G. S. West.
" *brachiatum* Ralfs.
" *brasiliense* var. *lundellii* W. & G. S. West.
* " *brevispinum* f. *major* W. & G. S. West.
* " *curvatum* var. *elongatum* G. M. Smith.
" *dickiei* var. *maximum* W. & G. S. West.
" *grallatorium* var. *forcipigerum* Lagerheim.
* " *limneticum* var. *cornutum* G. M. Smith.
" *leptocladum* Nordstedt.
* " *minnesotense* Wolle.
* " *muticum* var. *minor* Wolle.
* " *ophiura* Lundell.
* " *ornithopodum* W. & G. S. West.
" *paradoxum* var. *osceolense* Wolle.
" *quadrangulare* var. *armatum* W. & G. S. West.
" *quadrispinatum* Turner.
* " *radians* W. & G. S. West.
" *rotula* Nordstedt.
" *setigerum* Cleve.
* " *spiculiferum* G. M. Smith.
* " *spongiosum* Brébisson.
" *tohopekaligense* Wolle.
" *trifidum* var. *inflexum* W. & G. S. West.

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*New record for Florida.

**Staurastrum vestitum* Ralfs.
* " *vestitum* var. *semivestitum* W. West.
* " *wolleanum* var. *intermedium* W. & G. S. West.
Sphaerozosma excavatum Ralfs.
" *vertebratum* f. *minor* W. West.
Onychonema laeve Nordstedt.
" *laeve* var. *micracanthum* Nordstedt.
* " *filiforme* (Ehrenberg) Roy & Bissett.
Spondylosium planum (Wolle) W. & G. S. West.
" *pulchrum* (Bailey) Archer.
Hyalotheca dissiliens (Smith) Brébisson.
" *mucosa* (Dillwyn) Ehrenberg.
* " *neglecta* Raciborski.
Desmidium aptogonum Brébisson.
* " *aptogonum* var. *ehrenbergii* Kuetzing.
" *baileyi* (Ralfs) Nordstedt.
" *coarctatum* Nordstedt.
" *cylindricum* Greville.
* " *gracileps* (Nordstedt) Lagerheim.
" *quadratum* Nordstedt.
" *swartzii* Agardh.
" *swartzii* var. *quadrangulare* (Ralfs) Roy.
Gymnozyga moniliformis Ehrenberg.
* " *delicatissima*.
Phymatodocis nordstedtiana Wolle.
* " *nordstedtiana* var. *minor* Borgesen.
Triploceras gracile Bailey.
" *verticillatum* Bailey.
**Mateola acutiloba* n. gen. et sp.

Micrasterias alata Wallich.

The first record for the United States, although Lagerheim reported it for Cuba.

Micrasterias floridensis n. sp. (Pl. I, Fig. 2.)

Cells large, about as long as broad, suboctangular, deeply constricted, sinus linear. Semicells five-lobed, interlobular incisions narrowly linear; polar lobe cuneate, with dilated truncate apex, not projecting beyond the lateral lobes; lateral lobes almost equal and cuneate, divided into two lobules by a V-shaped incision; each lobule bifurcate into short spines. Vertical view fusiform. Cell wall finely punctate.

Zygospore unknown.

Length, 224–228μ; breadth 207–224μ; breadth of isthmus 21–22.5μ; polar lobe at apex 76–86μ.

Habitat: Keystone Lake near Odessa, Florida.

Micrasterias foliacea Bailey. (Pl. I, Fig. 7.)

M. foliacea Bailey occurs abundantly around Riverview and Childs. Cells with a zygospore were found at Riverview, April, 1933.

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*New record for Florida.

Zygospore ovoid with stout bi- or trifurcate spines. Length of zygospore without spines 52μ; thickness 38μ; length of spines 17–21μ.

Turner (1893) figures the zygospore of the species and Krieger (1932) figured the zygospore of the var. *ornata*. The latter differs so markedly from the zygospore of *foliacea* vera that one is led to conclude that it either should be made a distinct species, or else that Krieger did not have the zygospore of the variety.

Micrasterias piquata n. sp. (Pl. I, Figs. 3–5.)

Cells small, about 1½ times as long as broad, subrectangular with broadly truncate poles, deeply constricted, sinus slightly open; semicells three lobed, incisions below polar lobe shallow and open; polar lobe broad with apex slightly convex and terminating in two (rarely one) laterally extending short spines, lateral lobes subrectangular, with two (sometimes one) short parallel spines at each corner. Vertical view of semicell broadly oval.

Zygospore unknown.

Length, 100–111μ; breadth, 83–96μ; thickness, 37μ; breadth of isthmus, 17–19μ.

Habitat: Pond 6 miles south of Riverview.

Micrasterias ranoides n. sp. (Pl. I, Fig. 1.)

Cells large, a little longer than broad, circular, deeply constricted, sinus open; semicells 5-lobed with deep, fairly open interlobular incisions; polar lobe cuneate with apical margin retuse with the lateral margins drawn into spines at each corner. Lateral lobes equal and cuneate, each divided into lobules by a wide open sinus about half as deep as the interlobular sinus; each lobule drawn into two long diverging spines. Side view of cell fusiform with polar lobe about half as thick as cell. Cell wall smooth.

Zygospore unknown.

Length, 208–269μ; breadth, 202–259μ; breadth of isthmus, 21–23μ; length of polar lobe, 102–118μ; thickness, 45–50μ; breadth of polar lobe at base, 19–20μ; at apex, 74–79μ; length of spines, 20–25μ.

Habitat: Keystone Lake near Odessa, Fla.; Okeechobee, Fla.

Micrasterias radiata Hassall.

Many varieties have been given for this species, but as they do not appear to be distinct they cannot be maintained. The lateral lobes may be very narrow as in *M. dichotoma* Wolle. They may be reduced in number as in the variety *simplex* Smith.

Micrasterias sol var. *ornata* Nordstedt. (Pl. I, Fig. 10.)

Abundant in several localities: Riverview, Childs, Okeechobee, etc. Specimens with zygospores were found at Riverview in April, 1933.

Zygospore spherical with stout acute spines, some of which are curved. Diameter of zygospore without spines, 83–86μ. Length of spines, 38–45μ; thickness at base, 9μ. Length of cell, 196–214μ; breadth of cell, 200–203μ; breadth of isthmus, 21–22μ.

Staurastrum muticum var. *minor* Wolle. (Pl. I, Fig. 6.)

The zygospore of *Staurastrum muticum* shown in W. & G. S. West (Vol. 4, Pl. 118, Fif. 20) (from Ralfs) does not agree with those found

near Kissimmee. Cushman (1903, p. 224) gives a description of zygospores which agree very well with those found in Florida. Either Ralfs has incorrectly figured the zygospore of this species, or else the smaller form has zygospores quite different from the species vera, in which case it would be entitled to specific rank. Further data are needed before a correct assignment can be made.

Mateola n. gen.

Cells united into twisting filamentous colonies. (No gelatinous sheath evident). Body of cell about twice as long as broad, shape of a right parallelopiped with each of the eight corners extended into a thick process, making complete outline of cell roughly cubical. Processes semicrescent-shaped with cusps diverging from isthmus. A chloroplast in each semicell having two pyrenoids.

Zygospore unknown. Figure shows cells in process of ordinary cell division.

Mateola acutiloba n. sp. (Pl. I, Fig. 9.)

Description as in genus.

Length of cells, 30μ; breadth over all, 41μ; breadth of apices, 13μ; breadth of isthmus, 22μ.

Habitat: Pond between Sanford and Mt. Dora, Fla. Collected December, 1932.

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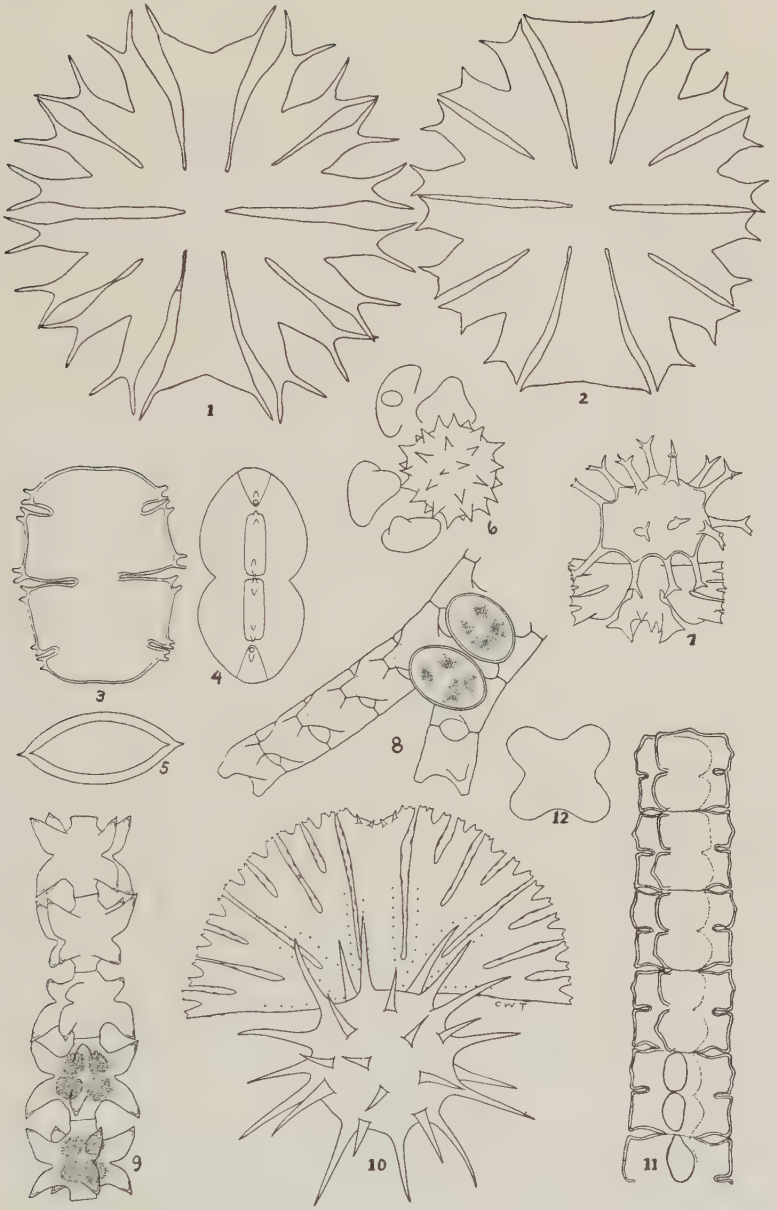

Fig. 1. *Micrasterias ranoides* n. sp.
Fig. 2. *Micrasterias floridensis* n. sp.
Figs. 3–5. *Micrasterias piquata* n. sp.
Fig. 6. Zygospore of *Staurastrum muticum* var. *minor* Wolle.
Fig. 7. Zygospore of *Micrasterias foliacea* Bailey.
Fig. 8. Zygospores of *Desmidium baileyi* (Ralfs) Nordstedt.
Fig. 9. *Mateola acutiloba* n. gen. et sp.
Fig. 10. Zygospore of *Micrasterias sol* var. *ornata* Nordstedt.
Figs. 11–12. *Phymatodocis nordstedtiana* Wolle.

BOOK NOTICES

Beetles

This publication should be of invaluable assistance to research workers in entomology, especially those who are interested primarily in Coleoptera. The subject matter accumulated by the compiler contains citations to technical descriptions in literature of the egg, larva, and pupa of the Coleoptera of America North of Mexico. This paper supplements and brings down to date the work published by Wm. Beutenmuller in 1891, entitled "Bibliographic Catalogue of the Described Transformations of the North American Coleoptera" in the Journal of the New York Microscopical Society, Vol. 7, pages 1–52. The arrangement of the material is somewhat in conformity to the general plan followed by Henry Edwards in his "Bibliographical Catalogue of the Described Transformations of North American Lepidoptera," published in 1889 as U. S. National Museum Bulletin 35. Each reference includes the following information: name of genus; name of species, if known; name of author of original description of adult insect; notation of the various stages of which description is cited, as egg, larva, or pupa, and whether or not illustrations are included; biological data; name of author of additional descriptive material; periodical or other work in which description appears, with volume, page, and date. All references are arranged alphabetically, first by genera and then under each genus, alphabetically by species.—R. DAVIDSON.

A Contribution to a Bibliography of the Described Immature Stages of North American Coleoptera, by J. S. Wade. Mimeograph Number E-358 of the U. S. Dept. of Agriculture, Bureau of Entomology and Plant Quarantine, Washington, D. C., September, 1935.

Insect Enemies of Shade Trees

The author, in writing this book, brings together considerable information concerning insect injury to shade trees. There has been an increasing demand for such information, especially in recent years because of increased interest in forestry problems.

There are three introductory chapters: The Value of Shade-Trees and General Methods of Protection from Insect Attack; Materials and Apparatus for the Control of Tree and Shrub Insects; Suggestions for the Treatment of Weakened Trees. Following these a chapter is devoted to each of the important shade trees and shrubs giving the various insects which attack them, means of detecting their presence, their life histories, nature of attack, and the best means of control. An index to the trees and shrubs is given in addition to the general index. This cross-referencing increases the utility of the book. Many references to literature are given following the discussion of a particular insect problem. The book is well written and well illustrated on good quality paper.

It should serve not only as an excellent reference for members of State Departments of Agriculture, home owners, and Extension Entomologists, but for students of forestry and forest entomologists as well.—R. H. DAVIDSON.

Insect Enemies of Shade Trees, by Glenn W. Herrick. 417 pp. Ithaca, The Comstock Publishing Company. 1935.

Earth

For those who want a light and interesting but withal accurate tale of the earth, this new book by J. H. Bradley will be found suitable. Bradley has taken the story told by the earth and rewritten it in a manner which is easily understood. The entire history is dramatized, and as the picture is unfolded we find a delightful story dug out of the rocks and presented to us in charming and living style. It is very good reading, and well worth the time spent. The 8 illustrations are more or less modernistic.—WILLIARD BERRY.

Autobiography of Earth, by John Hodgdson Bradley. 348 pp. New York, Coward-McCann Inc. 1935.

Sound

This little book is an expansion of the author's presidential address before the Acoustical Society of America in 1932. It presents in an interesting style the contributions of important persons in this field from Pythagoras to the beginning of the 20th century. Short personal sketches of the pioneering efforts of outstanding contributors to acoustical problems are grouped under such headings as: harmonics and acoustics, early experimentation, music, the era of the calculus, the science of sound, theories of sound, etc. There are numerous illustrations of important personages, early apparatus, etc. It will prove interesting particularly to students beginning the study of acoustical problems, although as the title indicates it is by no means an intended or achieved comprehensive history of this field.—S. RENSHAW.

Anecdotal History of the Science of Sound, by D. C. Miller. xii+114 pp. New York, the Macmillan Co., 1935.

Science of Man by a Man of Science

The distinguished Nobel Prize Winner Alexis Carrel has turned his hand to a treatise on man, and the result is disappointing. The book is frankly teleological, metaphysical and metapsychical. It is crammed with facts and near-facts, but they are inextricably entangled with the author's personal opinions, which are, to say the least, unorthodox. An occasional plain mistatement of fact occurs, such as on page 90 and again on page 250, where the ovum in its development is said to eject half of each chromosome in the reduction division.

The author exhibits a sincere belief in clairvoyance, mysticism, telepathy, and the power of prayer over disease: strange beliefs indeed in a scientist; beliefs, however, which he hopes will not be merely laughed off, but investigated with the techniques of physics, physiology and medicine.

A chapter on adaptation uses almost entirely teleological explanations. The best chapter in the book concerns physiological time. There are several good discussions of the interactions of heredity and environment. Here and there one meets with surprisingly good eugenic suggestions.

The climax of the volume is reached in the final chapter on the remaking of man. The suggestions are unique, a strange mixture of clear insight and impractical subjective idealism. If the scientific reader can control his exasperation long enough to finish the volume, he will find the reading worth while if for no other reason than the controversial issues it raises. The lay reader, unfortunately, will find in the book justification and backing for many of his superstitions and dogmas.—L. H. S.

Man, the Unknown, by Alexis Carrel. xv+346 pp. New York, Harper and Brothers, 1935.

Genetics and Society

This little volume is a concise straightforward presentation of the facts, principles and legitimate inferences of genetics, leading to a discussion of eugenics. The author knows his genetics thoroughly, and expounds it well. He thinks clearly, and expects the reader to do likewise. For the eugenecist the author has nothing but pity. He feels that eugenics as now concieved is not only useless, but socially dangerous. The eugenecists, he claims, demand, with unabashed impudence, sterilization for the sole purpose of saving humanity from the misery of disease, deformities and incompetence, and yet find nothing but approval for an economic system which brings misery to the vast majority of mankind. The author pleads for a better social environment, which if attained, will not only be valuable for its own sake, but should make it possible to accurately determine the role of heredity in the production of human traits; an accuracy which is at present woefully lacking. He likewise contends that so long as an individual performs a socially useful task, he is on a par with any other member of society doing socially useful work. The genetics of the book is splendid; the eugenics is subject to some debate. The book should most certainly be critically read, however, by all biologists.—L. H. S.

Genetics and the Social Order, by Mark Graubard. 127 pp. New York, Tomorrow, Publishers, 1935.

Endocrines

Pioneering in the graphic presentation of informative material Miss Gregory has prepared this interesting and effective book dealing with the endocrines. The graphic methods of expressing a fact or conveying an idea should popularize the work and make it of interest to the general reader without any great sacrifice of scientific accuracy. The retention of scientific accuracy makes the work of value to the student and medical practitioner. The originality of this book lies in the method of presentation rather than subject matter. Each endocrine gland is taken up separately and its story told by a series of charts and diagrams. The last chapter presents information on glandular relationships in the same manner. A useful glossary is included.—T. S. SUTTON.

A B C of the Endocrines, by Jennie Gregory, 126 pp. Baltimore, The Williams and Wilkins Company, 1935.

Marching Deserts

During the last year dust has been blown into regions where no foreign dust had fallen in the memory of man. The newspapers told us of the great dust storms of the grain belt. Much was said of the storms, but little of the cause and still less of the cure. It remained for Professor Sears to give us the cause and effect and to discuss the means of a cure. In his "Deserts on the March" he traces the slow depletion of the soil and the lack of logical conservation of fertility of the land, due partly to lack of knowledge and partly to the careless habits of society. The effects are loss of pasture, loss of forest (and lumber) and finally loss of the productive soil, thus killing plants and animals both on land and in inland waters, besides causing floods and dust storms. What effect will this destruction have on our future population who will need food and water even as you and I? The cure is careful long range regional planning which will direct the users of the soil into the proper management of the land. It cannot be accomplished over night but, if we as a nation are to prevent the rape of the soil, we must allow and support intelligent investigations into uses of the land.

Professor Sears has presented marching deserts with the delightful fascination of a novelist. We hope this strongly written book will bring home the facts of the case to the persons concerned and help in showing all of us how to correct this growing loss.—WILLARD BERRY.

Deserts on the March, by Paul B. Sears, 231 pages. Norman, Oklahoma, The University of Oklahoma Press, 1935.

Fossil Invertebrates

The authors recognize 12 phyla of invertebrates. In checking over this dozen a paleontologist will miss our old friends "Vermes" which are here handled from the modern zoological classification, including Platyhelminthes, Nemathelminthes, Trochelminthes, and Annelida. This is a logical move as it makes comparison of living forms much clearer. Another missing friend is Molluscoidea which is here divided into separate and distinct phyla; Bryozoa and Brachiopoda. This is not a new separation but it is pleasing to see that the authors have not fallen back on the older classification. The other phyla are stereotyped. In discussing the various phyla they are usually divided to the rank of orders and occasionally lower. The classes are the main units of discussion and the ecology and geologic history of each class are generally given; in some cases larger groupings are considered together. References are grouped at the end of the phylum discussions. The illustrations are both linecuts (some diagrammatic) and halftones, well selected and many from quite recent publications. There are 175 "figures" some having as many as 27 illustrations per figure. There are also 11 charts showing geologic range of various groups. There is quite a complete index.

This new invertebrate paleontology is more detailed than any modern invertebrate texts in English. The discarding of "Vermes" and the use of the modern classification is excellent. For beginning students in invertebrate paleontology it should prove very useful. It is gotten up in the usual excellent style of the publishers.—WILLARD BERRY.

Invertebrate Paleontology, by W. H. Twenhofel and R. R. Shrock. xvi+511 pp. New York, McGraw-Hill Book Company, 1935.

Geology for Engineers

This book is divided into 3 parts. Part I is on building material, in which certain theoretical considerations are discussed, including the common rock-forming minerals, the principle rock types, their occurrence and physical character, and some 28 pages devoted to the choice of materials. Part II is on Field Operations. Here the earth's crust and earthquakes are discussed, followed by a treatment of landslides, quarrying, tunnelling, retaining walls both above and below ground and building sites. Part III takes up water supplies, including discussed rainfall, rivers, tides, surface and subsurface water, and the quality of water. The author uses many actual examples to bring out his ideas. The examples are usually well illustrated, either with diagrams or photographs. For instance, some 25 photomicrographs are used in Part I in the discussion of building materials. As would be expected the illustrations are largely drawn from the author's field experience, which is India.

There are a rather large number of what are evidently typographical errors which detract greatly from the book. On page 7 ultra-violet light is given as $4x10^{-5}x10^{-7}$ whereas it should be $4x10^{-5}$ to $4x10^{-7}$. On page 38 a table on chemical composition (of rocks) referred to Clarke's Data of Geo-Chemistry Bulletin 330, U. S. Geological Survey, p. 261, is found on page 31 of the Bulletin which was published in 1908. This bulletin has been revised 5 times since then, the latest being published as U. S. Geological Survey Bulletin 770 in 1924. The table in the later editions has been brought up to date as information has become available. The body of the table does not check with Clarke's table. In igneous rocks Clarke has Cl 0.07%; Fox gives 0.42%. In shales Clarke has alumina 15.40%; Fox gives 15.04%. Chlorine Clarke has as 0.00; Fox gives 1.49. In sandstones Clarke records no chlorine; Fox gives 0.12%. In limestone Clarke records chlorine 0.02%; Fox gives 0.12%.

On page 90 the refractive index of Canada balsam is given as 1,534 (should have decimal point not comma); in the following table the figure is 1.54, in same table on page 91 as 1.534, and on page 92 as 1.543. The usual index used for Canada balsam is 1.54.

Page 111 says " . . most of which (20 percent) is in the form of silica, 25 percent of alumina . . "; certainly 20% is not most, especially as 25% is definitely stated to be alumina. But why go on? The examples are numerous. In addition, the references are often incomplete, as for example, "The most recent of these ('Economic Aspects of Geology' by C. K. Leith) gives . . ." It may be most recent (being published in 1921), but no date of publication being given makes it difficult to locate the reference for one unacquainted with the literature (and the book is apparently for beginners). There is no collecting of references either as footnotes or at ends of chapters, or at the end of the book itself. As a textbook it gives too little geology to be called engineering geology. For a handbook of engineering practice it might pass, but this reviewer would never give it to students. All in all, it can not be recommended as a text in engineering geology.—Willard Berry.

A Comprehensive Treatise on Engineering Geology, by Cyril S. Fox. 392 pages. New York, D. Van Nostrand Company, 1935.

Why and How?

It is a familiar phenomenon to research workers that the solving of one problem only serves to open up more and varied problems. In this volume the author undertakes to show how many unsolved problems there are in science, in spite of the rapid advance of knowledge in recent decades. Such problems range from the creation and the nature of the universe, to the origin of life and the nature of physiological processes. Some of these are inherently insoluble, others are subject to slow progress, and still others may be considered as approaching solution. For most of them, however, the scientist may well be content to discover what appears to be the basic economy of the natural world, and to learn, so to speak, how to oil the works when he can get at them. In an age in which rapid scientific advancement is taken for granted, such a book as this may well cause us to pause and consider some of the unsolved problems.—L. H. S.

Unsolved Problems of Science, by A. W. Haslett. xi+317 pp. New York, the Macmillan Co., 1935.

Structural Geology

Some time ago Bohuslav Stoces published a book in Czech and German on structural geology which was widely acclaimed. It remained for Charles H. White to elaborate the work of Stoces and publish it in English. This textbook of applied geology is divided into 2 main parts: primary structures of rocks, and induced or secondary structures due to orogenic movements in the earth's crust. The primary structures are discussed throughout 108 pages, in which are taken up structures of sedimentary and igneous rocks and associated mineral deposits. In the second part after a brief discussion of causes and results of movement, there are taken up folding, faulting, joints, veins, unconformities and associated surfaces, types of structures in folded and faulted regions, relation of folding to ignious activity and mineralization. The last 58 pages concern surveying and mapping structures, geophysical methods, geologic maps and influence of structures on mining practice. There is a short glossary and bibliography.

The authors make no attempt to explain exactly why and how the various structures originate. They try to tell what the structure is and how to recognize it. For yhis purpose descriptions and excellent illustrations, both diagrams and photographs, are used. (There are 664 illustrations in 460 pages.) The illustrations are largely European and a welcome relief to those accustomed to certain, much used illustrations of English structural geologies, being so very well illustrated. Because of elaboration and additions, especially of illustrations, it is an advance over Stoces' original Czech and German text on the same subject. As a textbook for geologic structures and as a dictionary of structures for the geologist it can be well recommended.—Willard Berry.

Structural Geology, by Bohuslav Stoces and Charles Henry White. 460 pages. New York, D. Van Nostrand Co., Inc., 1935.

Predaceous Coleoptera

In the entomological literature throughout the world many valuable papers and notes occur which present data on the natural enemies of insects. Compilations of such information are of decided value to investigators interested in biological control. One of the first compilations on this subject matter in the english language has been assembled and published by Dr. Balduf in his excellent new book entitled "The Bionomics of Entomophagous Coleoptera."

The book presents in fairly complete form all the important and known biological information on fifteen or more families of predacious beetles. For each family data on the following topics and others are presented, namely; general features, habitats, activities of the adults, natural enemies, food and feeding of the adults, mating, oviposition, incubation, hatching, activities of the larvae, locomotion, respiration, food and feeding of the larvae, economic importance, hibernation, aestivation, pupation and life cycle. Over one hundred figures of insects and their parts are inserted in the text. Those redrawn by Mrs. Balduf are clear cut and nicely drawn. The literature cited is presented at the end of the book under each family of Coleoptera. The author also has prepared a fairly complete index of authors, insects and other facts. The book is planographed, 8 x 11 inches, and bound in cloth.

This reviewer has had considerable experience in compiling information of this character, consequently he appreciates the great amount of tedious work and painstaking efforts needed to compile a book such as Dr. Balduf has produced. It is hoped that this author or others will continue to assemble the widely scattered information on other groups of entomophagous or parasitoid insects.—Alvah Peterson.

The Bionomics of Entomophagous Coleoptera, by W. V. Balduf. 220 pp. Published and planographed by John S. Swift Co. Inc., St. Louis, Mo., 1935.

The Study of Psychology

This is the tenth book in the Prentice-Hall Psychology Series, edited by F. A. Moss. The Study Outline follows no single textbook of general psychology but is intended for use with any one of thirty-five of the texts in most common use. Each of the thirteen chapters follows the same pattern: first, a summary of the content, then exercises and review questions, and finally a bibliography

with references to specific chapters in the textbooks of general psychology as well as to large numbers of books and articles pertinent to the subject discussed. The summaries are usually sound and to the point, the exercises and review questions provocative of thought, and the bibliographies show that the available sources have been well canvassed. With the exception of the field of motivation which is treated with too great brevity, The Study Outline covers the field of the introductory course very ably.

Physically the book is large, nine by fourteen inches, paper bound, and has wide margins for notes. All the leaves are perforated, thus allowing those used for assigned exercises to be torn out and handed in.—R. C. CHALLMAN.

Study Outline for General Psychology, by S. L. Crawley. ix+223 pp. New York, Prentice-Hall, Inc., 1935.

Eclipses of the Sun

The very earliest records of history have brought to us accounts of solar eclipses and indeed probably no other natural event has ever made such an impression on the human consciousness from the early primitive to the modern sophisticate. It is distressing, therefore, to find that this fourth edition of what might be the standard work in the field, continues to be a combination of travelog, popular-scientific and scientific record. There is much in the book that is good, entirely too much that is superfluous, omitted, or poorly balanced in relation to other subjects. The author has inadequately discussed the early history of eclipses: a pity, because of their importance in the establishment of early dates. There follows chapters on prediction and verification of eclipses, then two chapters on the history of the spectroscope which undoubtedly make interesting reading for the lay reader, but for which there is small place in a book of this title. After a few general remarks concerning the sun, there begins the travelog leading up through the author's personal experiences on a number of eclipse expeditions.

One of the outstanding faults of the book occurs in a twenty-page discussion on the structure of the atom. The reviewer is frankly astonished that any modern author of a book on physical science should devote space and emphasis to the Bohr circular orbit theory of the hydrogen atom when this theory has been quite obsolete for at least ten years, receiving mention nowadays only as an example of how an atomic theory ought not to be.

In brief then, the book leaves much to be desired as a contribution to scientific literature. This will not, however, prevent its being an interesting narrative to an uncritical lay reader who wants to learn something about the sun and its eclipses.—C. E. HESTHAL.

Eclipses of the Sun, by S. A. Mitchell. Fourth edition, revised and enlarged. xvii+520 pp. New York, the Columbia University Press, 1935.

The Invertebrates Revised

The first edition of this standard work was noticed in this journal (Vol. 32, p. 435). The revised edition is 80 pages longer, with much new material on physiology. and more complete general discussions. The newly-added discussion of organism and environment, and the excellent revised summary of the comparative physiology and morphology of the metazoa may be mentioned. The chapter on the Insecta has been considerably enlarged, with additions on insect physiology and more detailed descriptions of the various orders. Minor changes and additions have been made in the classification, and a number of new figures added. Revision has produced a more complete and coherent textbook, with greater emphasis on life processes. It remains the most concise and well-written recent book in its field. As in the preceding edition, some of the descriptions of type forms seem insufficiently detailed, and the discussion of evolution and phylogeny is woefully limited.—HERMAN VON DACH.

The Invertebrata: A Manual for the Use of Students, by L. A. Borradaile and F. A. Potts, with chapters by L. E. S. Eastham and J. T. Saunders. Second edition. xv+725 pp., 483 figs. New York, The Macmillan Co. (Cambridge, at the University Press), 1935.

The Story of Multiple Stars

At least one star in every eighteen seen in the northern hemisphere through the 36-inch telescope of the Lick Observatory is a multiple system of two or more stars. A statistical study makes it seem very probable that about two-fifths of all the stars are multiple. From this the importance of the subject soberly and adequately discussed in this book can readily be inferred. The author, director and astronomer emeritus of the Lick Observatory of the University of California, is one of the leading contributors to this field of astronomy. He has achieved a well considered balance between the amount of space devoted to the historical development of the subject, exposition of the experimental and mathematical methods, and the discussion of the results so obtained.

The last four chapters in the book are devoted to a summary and interpretation of the known facts. A few of the most interesting systems are described in detail. The possible theories of origin of multiple stars are critically examined. The conclusion to which the author comes is that there is, as yet, no satisfactory theory. Although several thousand systems have been examined, the amount of data so far obtained is insufficient to provide a suitable foundation for an adequate theory.

The book is primarily intended for readers who have some training in astronomy and mathematics, but 140 of the 280 pages of text could be read by anyone with no other preparation than an interest in astronomy.—C. E. HESTHAL.

The Binary Stars, by Robert Grant Aitken. Second edition, revised. xii+309 pp. New York, McGraw-Hill Book Company, 1935.

What of the Future?

A visit to the Century of Progress Exposition impressed Dr. Furnas with the fact that while much seeming progress was shown, much of the progress and efficiency which one might reasonably expect was sadly lacking. So impressed was he by thoughts of this kind that he conceived the idea of a book on what our "Century of Progress" had failed to produce or to solve. The result is a very fine discussion of our unsolved problems. Beginning with biology, which he considers as less fundamentally important than physics or chemistry, but first in the public mind, the author continues through chemistry, physics, engineering and finally the social sciences. Dr. Furnas displays a profound knowledge of all of these subjects. He discusses them with clear insight, forceful logic, and delightful literary style. A fine sense of humor permeates the book, and breaks out irrepressibly at frequent intervals. This is one of the "must" books of the year.

—L. H. S.

The Next Hundred Years, by C. C. Furnas. xiv+434 pp. Baltimore, the Williams and Wilkins Co., 1936. $3.00.

Another Astronomy for the Layman

Stimulated by the success of two prominent English authors who have written popular books on astronomy and physics, several authors have turned their attention in the same direction. One of these, the Astronomer Royal of England, is the author of this book. To the interested but uninformed reader, it will undoubtedly be worth the reading time. As a second book following one of those above referred to it will be a disappointment because the reader will already have been supplied with something better, though more difficult.

The book is written in a very simple, understandable style and should be popular with readers of Junior College age. There is a commendable chapter dealing with the question of life on other planets in which the author discusses the physical evidence for living conditions, discarding all planets, as do most authors, except Venus and Mars. Limitation of the discussion to the physical evidence is unfortunate. The biological factors should be given equal weight with the physical but perhaps this is too much to expect of an astronomer author. The book is liberally illustrated with the usual selections.—C. E. HESTHAL.

Worlds Without End, by H. Spencer Jones. xv+329 pp. New York, The Macmillan Co., 1935.